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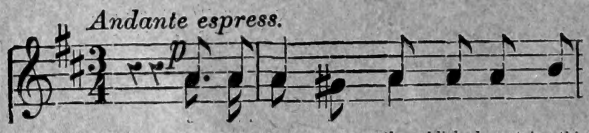

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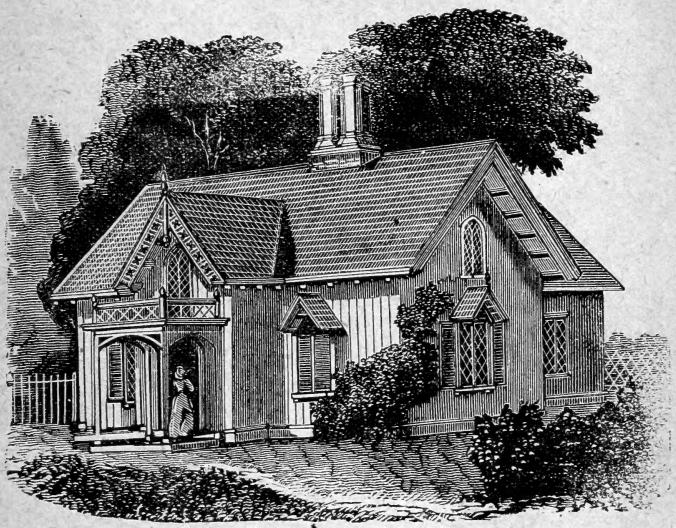


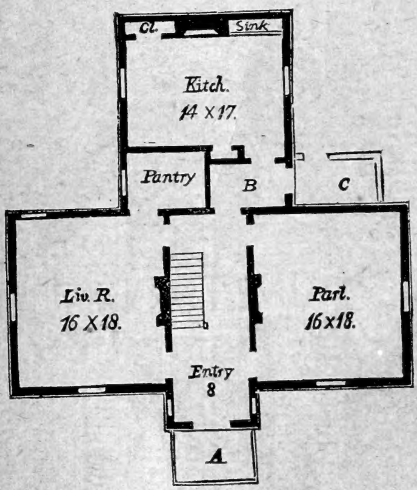
AN INEXPENSIVE COTTAGE.—ELEVATION.

An Inexpensive Cottage.—We give the plan of a neat and beautiful country cottage, the low cost of construction of which adapts it to the wants of those in moderate circumstances, while, in attractive appearance and general convenience, it rivals those of a much higher cost.

This cottage is designed in the rural Gothic or English manner, but much modified, so as to adapt it to almost any site. The light, open porch may be omitted without injuring the design. In the plan, *A* is the porch, from which we enter the hall or entry, 8 feet wide, with the two best rooms, each 16x18 feet, on either side of it. Connected with the living-room, in its rear, is a good pantry. *B* is the back entry, communicating with the kitchen. *C* is the back porch, which may be left open in summer, and inclosed in winter, when it will serve as a place for coal and wood. On one side of the kitchen fire-place is a closet, and on the other a sink, into which, if possible,

a water-pipe should be brought. The first story of this cottage is 10 feet, and the second story 5 feet, on the sides, and 8 feet in the middle of the rooms. The pitch of the roof is a right angle. The cost of this cottage, with the interior neatly finished and painted in oil color, and the two principal rooms grained and varnished like oak, and their walls papered with suitable paper—all the other rooms having brown walls whitewashed—would be about $800.

An Ornamental Country Cottage.—We give on pages 13 and 14 illustrations of a plan and elevation of a cheap, but very ornamental, country cottage, which will be found both convenient and comfortable for a small family. If this plan is not extensive enough to meet your wants, it can be easily enlarged upon by making additions, or by enlarging the size of the whole plan, and thus increasing the dimensions of the rooms. This, however, would necessarily add to the cost of construction. The cottage, as shown in our illustration, presents a very aristocratic appearance, and, considering the small amount of money required for its construction, is, we think, a very desirable plan for a cheap and good dwelling-house. The dimensions of the rooms on the ground floor are plainly given in our second illustration. The porch, with its seat, is large and roomy; the living-room is of good size, well lighted by a square bay-window. The kitchen is well supplied with closets. The first floor could be very much improved by adding a one-story kitchen at the rear, making the living-room into a parlor, and the kitchen into a dining and sitting-room; the additional cost would be very small. The second floor contains three bedrooms, very conveniently arranged, and each provided with a closet. The two downstairs rooms and the large front bedroom are supplied with open fire-places, the value of which for ventilation is so often overlooked in cheap houses. Besides this, there should be ventilating tubes or shafts in the chimney sides, with registers opening from each room, thus insuring a good system of ventilation. The roof should be ventilated by openings under the projected eaves. The estimated cost of this building is from $1,200 to $1,800, according to locality and style of finish.



AN INEXPENSIVE COTTAGE.—GROUND PLAN.

General Suggestions to Those Intending to Build.—The following excellent recommendations are from the *American Home and Farm Cyclopædia:* Farmers can afford to leave cellar-kitchens, basements, third stories, and all other unnecessary stair-climbing devices to their city cousins, who

have to count the cost of every square foot they build upon. The only advantage of second stories in the country is that they are more healthful for sleeping apartments.

If every fire has a separate flue, and each flue terminates in its own particular chimney-top, there will never be any trouble over smoking fires, if the chimney is high enough.

Proper care in the arrangement of various rooms will save those who have to do the housework a thousand needless steps. Kitchen and dining-

AN ORNAMENTAL COUNTRY COTTAGE.—ELEVATION.

room should always be adjoining apartments. The china closet best opens into the dining-room. A trap-door connecting the pantry with the dining-room is a great convenience. It is well to have the wood-shed very near the kitchen, and connected with it by a covered way, avoiding exposure in inclement weather.

An attic over the entire house, with a window at each end, will be found of signal utility for drying clothes in bad weather.

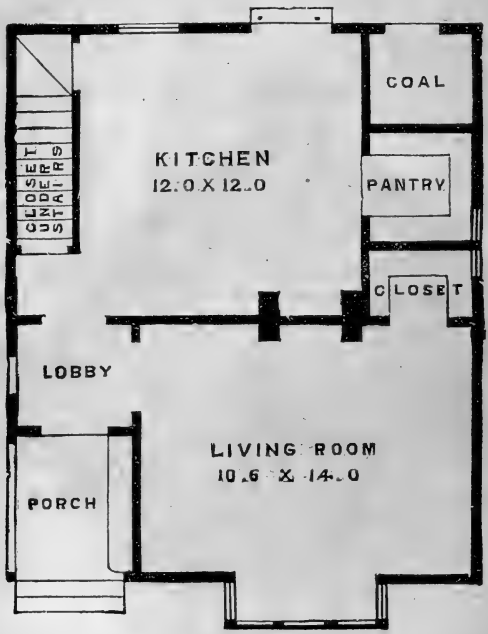
Provide plenty of closets and cupboards in all of the rooms. The lady of the house, who is the one most vitally interested in this matter, should not

be allowed to insist upon this in vain. Varnishing wood will make the paint last longer, and saves incalculable elbow grease in house-cleaning.

Shingles of cedar will last from thirty to forty years, and those of pine from twelve to twenty years.

In the arrangement of out-buildings, the following relative proximity will be found convenient: First, the house; attached to that the kitchen-wing, with wood-house appended; then, at a little distance, the privy, carriage-house, and workshop, with pig-sty and poultry-house adjoined.

Stone and brick walls should always be furred off, leaving an air space between the stonework and plastering throughout the entire wall, and open-



AN ORNAMENTAL COUNTRY COTTAGE.—GROUND PLAN

ing into the attic. This prevents dampness, and insures an equable temperature. Brick houses must have a slate, sheet-copper, or tarred paper cut-off inserted in the foundation just below the water-shed, as otherwise the moisture of the ground is worked up by the brick, keeping the walls constantly damp.

Frame houses may be made much warmer and more comfortable than they usually are by covering the studding with tongued and grooved sheathing, and this in turn by tarred building paper, placing the weather boarding over the whole. Fit the sheathing and weather boarding closely around door and window-frames, and let the tarred paper lap over a little where there is likely to be a crack.

Where ingrain carpets are to be used, it favors their economical cutting to have either the length or breadth of each room some multiple of their usual width—one yard—as twelve feet, fifteen feet, etc.

Construction of an Octagonal Barn.—There are various plans for laying out and building barns of this shape, in all of which the principles are the same. There is a concrete or stone foundation wall, which may be either below ground for a cellar or partially below it for a basement, or wholly above it for a stable, an inclined way being built on two opposite sides to give access to the barn floor. Upon this foundation the sills are laid, the corners being made at an angle of 135 degrees, instead of 90 degrees, as in the square building. There are no cross-beams necessary except upon the floor, there being eight bents in the building, all on the outside, the plates

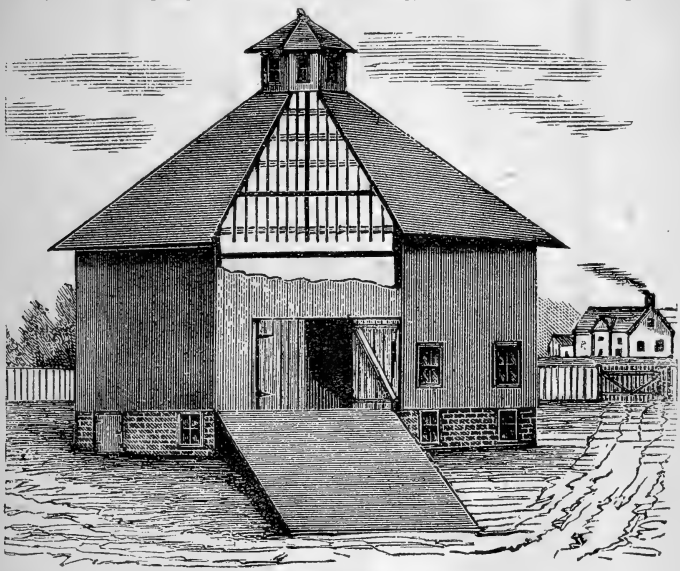


FIG. 1.—ELEVATION OF AN OCTAGONAL BARN.

being mortised exactly as the sills are, and the posts placed with regard to the necessary doors and windows, and the strength necessary to support the roof and stiffen the building. As many braces as may be thought needful may be used, but the braces must all be on the lines of the walls, and none of them cross-braces. The roof is an eight-sided cone, strengthened with purlin plates, and may be open at the center for a cupola or ventilator. The joints of all the plates and the sills will be at an angle of 62 1-2 degrees, instead of 45 degrees, as in a square building. This form of the frame will give a roof of the strongest kind—one that cannot spread, if well put together, and one that offers less resistance to the wind than any other form of elevated roof. Inside of the barn there is nothing to interfere with the piling of grain or hay to the roof, and a wagon may be driven anywhere upon

the floor. The plan of the basement is shown at Fig. 2, *a* being a passage for the cows, and a drive-way for removing the manure; *b*, *b*, are the stalls for the cows, of which there are fifty-two, having the feed-trough toward the center, and all reached by an inner drive-way. There are six stalls, and a room at each end of the stalls for harness. At *e* is a place for storing plows, carriages, wagons, or machines. A drive-way *(f, f)* passes through the basement from east to west. As many windows as needed may be built in the wall. The sills of the barn are laid upon the wall, as already mentioned; the posts are 28 feet high, and the plates upon these support the rafters. The plates are fastened together at the ends by being halved, and the corners fastened by half-inch iron bolts, as shown at Fig. 3. At each corner is a brace of 8x8 timber, bolted to and through the plates by three-quarter-inch bolts, and strengthened by an iron plate on the inside, through which the bolts pass. The shoulders of the corner rafters rest upon these braces and plates, as shown at Fig. 4. These rafters are of 6x12 timber. Purlin plates of 8x10 inch timber are bolted under the rafters, and are fastened together at the corners in the same manner as the plates. The intermediate rafters rest upon these purlins. Iron tie-rods may be used to strengthen the rafters and hold them together, if thought necessary. Fig. 1 shows the elevation, with a portion of the roof removed to show the manner of laying the rafters and bridging them. A crown rim is bolted to the rafters at the point of the roof —or, rather, the rafters are bolted to the crown rim—which supports a cupola. The cupola is fifty feet from the floor of the barn, the roof rising twenty-two feet, and the post being twenty-eight feet high. The floor of the barn is laid upon beams, supported by brick piers or timber posts in the basement. A line of beams may be laid above the floor on either side, above which floors may be laid; the space thus made may be used for granaries, or storage of farm tools or machines, or other cumbrous property.

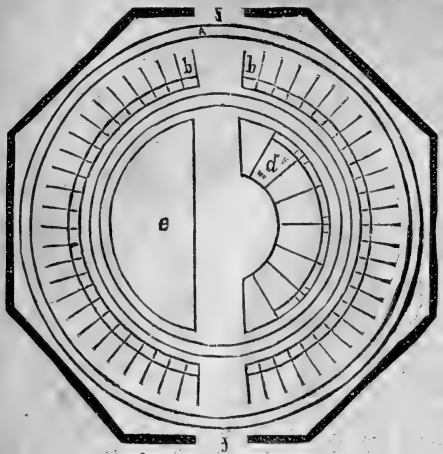


FIG. 2.—PLAN OF BASEMENT.

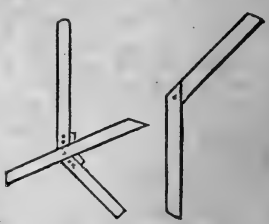


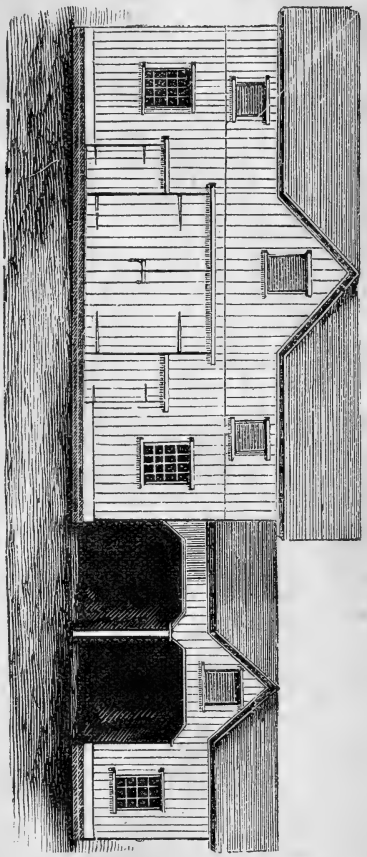
FIG. 3.—CORNER JOINT.

FIG. 4.—CORNER BRACE.

Plan for a Barn.—We present herewith a plan for a new and improved barn. For convenience, neatness of appearance, and practical utility, it will

be found most excellent, and should any of our readers contemplate building, they would do well to give this article a careful study; and should they not desire to follow out the plan to the letter, they might still be able to gain from it some valuable hints in planning a barn of a different style. The following is the description of the plan we have illustrated:

A, stables, 8x28, for nine cows, earth floor; B, man's room; C, carriages; D, harness room; E, meal or shorts; F, shelled corn; G, oats; H, passage-way; I, passage-way, 4 feet wide, platform floor, with pump; L, box for mixing feed; M, stairs; N, O, stalls, 5 feet wide; P, Q, R, stables, 6 feet wide; S, feed-bin for cattle; V, feed-box for horses; W, wagon shed, earth floor, 18x21; X, wagon shed, open at south and east, 9x17; Y, tool room, 9x10; Z, feed-bin; W, T, water-trough.

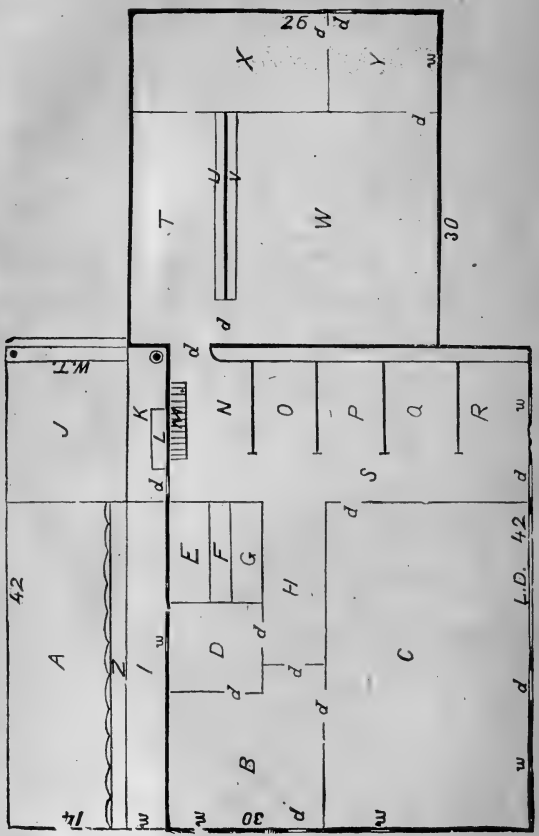


PLAN FOR A BARN.—FRONT ELEVATION.

Main barn, 30x42 feet; posts, 18 feet in the clear; shed wing, 26x30 feet; posts, 12 feet in clear; lean-to shed, 14 feet wide, 42 feet long—all to have roof at one-third angle of rise.

There will be 230 feet in length of wall underground, to be built of rough stone 1 foot high and 18 inches thick. Upon this is to be laid, in courses, quarried stone, in blocks, not less than 8x12 inches, 1 foot high and 1 foot thick, and all pointed. There will be required twelve piers, each 18 inches square and 2 feet high; these to be built of stone, and four of them to have the upper stone 12x18 inches. All to be laid in good strong lime mortar, and in a workman-like and substantial manner. There will be required for sills 334 feet in length of 8x8 timber, and 42 feet in length, 6x8; this last for the sill in front of cones in lean-to shed. For posts, girts of main beams, plates, etc., etc., there will be required 913 feet in length, of 6x6. For purlin beams, girts, etc., there will be required 454 feet of length, 4x6; and for intermediate girts, braces, etc., 394 feet of length, of 3x4 stuff. The sides should all be of oak or white pine.

The main beams, purlins, posts, girts, etc., may be of oak, ash, red birch, white pine, or white wood. The joists are to be of oak or white pine, and these will be required as follows: 103 pieces, each 14 feet long, 2x8; 20 pieces, each 9 feet long, 2x8; 20 pieces, each 10 1-2 feet long, 2x8; and 11 pieces, each 8 feet long, 2x8. The rafters will be as follows: 42, each 19 feet long, 2x4 at

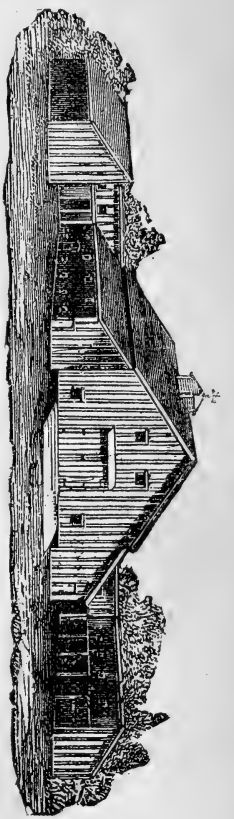


PLAN FOR A BARN.—GROUND PLAN.

one end and 4x6 at the other, for the main beam; 21, each 17 feet long, 3x4, for the lean-to shed; and 30, each 16 feet long, 2x4 at one end and 3x5 at the junction of the first with the second stories (as shown from outside). There should be a strip inserted of 2x2. The frieze board to be 8 inches wide and 2 inches thick. The boards all to be straight edge, and the whole to be battened with strips one inch thick and three inches wide, having the edges beveled half an inch, exhibiting a face of two inches. The whole to be of good, merchantable, dry pine timber. The roof boards may be of any light

and durable timber, and shall be laid so that no space of over two inches may be found. That portion of the roof which projects beyond the upright portion of the building shall be of double thickness. The shingles are to be of the best quality, and laid only 4 inches to the weather. The windows are to be made as per plan, all frames to be of seasoned pine, free from knots. The sash windows of 12 lights, each 9x12 inches, except two, viz., one in south end of main barn, and one in east side of same; these to be as shown in plan. The blind windows to be hung with butt hinges, and fastened with hasp hooks, both outside and inside. They are to swing outward.

The doors are all to be formed to present an appearance outside same as balance of barn. They are to be jack-planed sufficiently to render them free of splinters in handling. They are to be placed and formed of height, width, etc., as shown in plan. They are all to be hung with wrought-iron strap hinges, and secured by latches and hasp hook staples.



A COMPLETE STOCK BARN.—ELEVATION.

A Complete Stock Barn.—We present herewith an illustrated plan, with careful description, of a complete stock barn, embracing many good and sensible points in its construction, from which we trust our friends may gather some valuable suggestions.

The body of the main barn is 100 feet long by 50 feet wide, the posts 18 feet high above the sill, making 9 bents. The beams are 14 feet above the sills, which is the height of the inner posts. The position of the floor and bays is readily understood from the plan. The floor, for a grain barn, is 14 feet wide, but may be contracted to 12 feet for one exclusively for hay. The area in front of the bays is occupied with a stationary horse-power and with machinery for various farm operations, such as threshing, shelling corn, cutting straw, crushing grain, etc., all of which is driven by bands from drums on the horizontal shaft overhead, which runs across the floor from the horse-power on the other side; this shaft being driven by a cog-wheel on the perpendicular shaft round which the horses travel.

A passage four feet wide extends between the bays and the stables, which occupy the two wings. This extends up to the top of the bays, down which the hay is thrown for feeding, which renders this work as easy and convenient as possible.

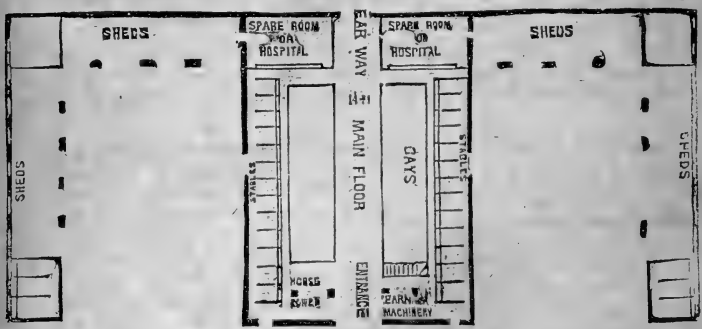
A one-sided roof is given to the sheds (instead of a double-sided), to throw all the water on the outside, in order to keep the interior of the yards dry. Eave-troughs take the water from the roofs to cisterns. The

cisterns, if connected by an underground pipe, may be all drawn from by a single pump if necessary.

The floor of the main barn is three feet higher than that of the stables. This will allow a cellar under it, if desired—or a deeper extension of the bays—and it allows storage lofts over the cattle, with sufficient slope of roof. A short flight of steps at the ends of each passage, admits easy access from the level of the barn floor.

The sheds, which extend on the three sides of the barn, and touch it at the rear end, are on a level with the stables. An inclined plane, from the main floor through the middle of the back shed, forms a rear egress for wagons and carts, descending three feet from the floor. The two rooms, one on each side of this rear passage, 16 by 34 feet, may be used for housing sick animals, cows about to calve, or any other purpose required. The stables at the front ends of the sheds are convenient for teams of horses or oxen, or they may be fitted for wagon houses, tool houses, or other purposes. The rooms, 16 feet square at the inner corners of the sheds, may be used for weak ewes, lambs, or for a bull stable.

Racks or mangers may be fitted up in the open sheds for feeding sheep



A COMPLETE STOCK BARN.—GROUND PLAN.

or young cattle, and yards may be built adjoining, on the rear, six or eight in number, into which they may run and be kept separate. Barred partitions may separate the different flocks. Bars may also enclose the opening in front, or they may, if required, be boarded up tight. Step ladders are placed at convenient intervals, for ascending the shed lofts.

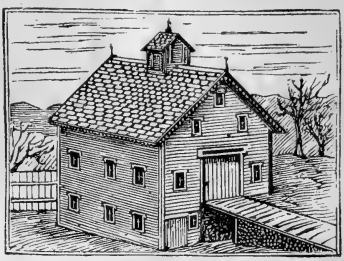
A granary over the machine room is entered by a flight of stairs. Poles extending from bay to bay, over the floor, will admit the storage of much additional hay or grain.

A Convenient Barn.—A recent inquiry about how to build a barn, writes a correspondent of an agricultural periodical, tempts me to describe mine, which I think very handy. My barn is situated on a side hill with an incline of about seven feet in forty to the west. There is a bridge at each end for a driveway, only one of which is shown in our illustration, Fig. 1.

On the right, as you enter the main door, the bays extend down to the ground nine feet. Under the main floorway I keep my sheep. Under the bridge each end is open, to give the sheep plenty of light and air, as it will not do to keep them too warm. In stormy weather I close the doors. On

the left of the main floorway is the cow linter, and, beneath, the pig pen. The arrangement will be more readily understood from the illustration, Fig. 2.

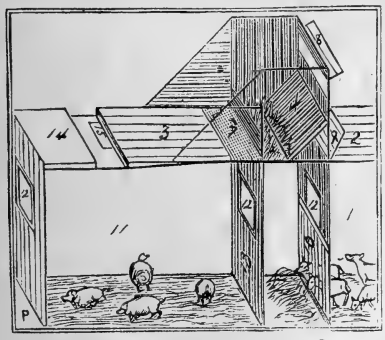
1. Sheep pen; 2. Barn floorway; 3. Standing floor in the linter; 4. Cows' manger; 5. Iron strap used instead of stanchion; 6. Tie chain; 7. A trough filled with dirt or sawdust for the animals' front feet to stand on, thus preventing slipping; 8. Cows' feed door; 9. Sheeps' feed door; 10. Sheep rack; 11. Pig pen; 12. Windows used for cleaning sheep pens and pig pens; 13. Tight partition; 14. Walk behind the cows; 15. Scuttle for cleaning out manure.



A CONVENIENT BARN.—FIG. 1.

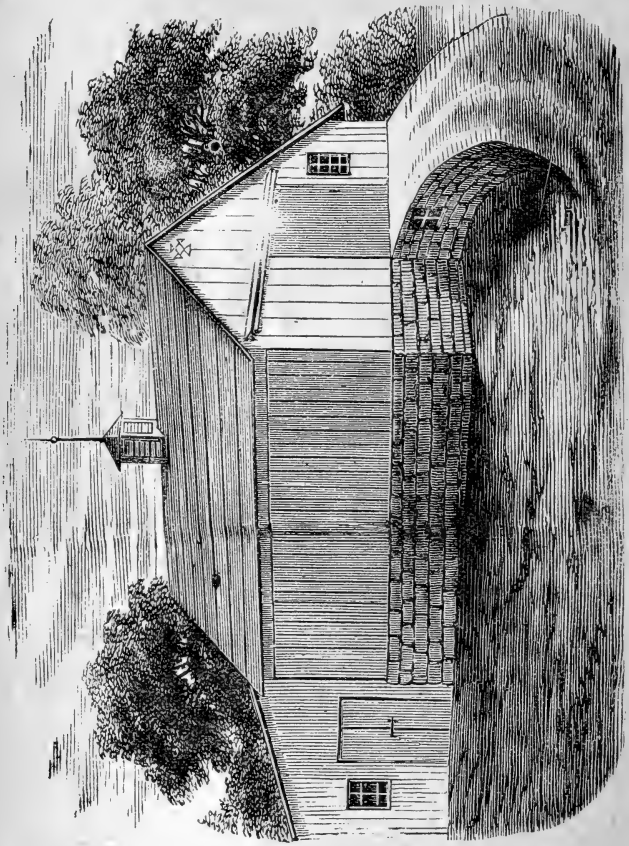
It will be noticed that the door through which the sheep are fed opens downward, and does not conflict with the cows' feed door, which lifts upward. By having these doors the linter can be closed up tight in cold weather, and the cattle will keep warm. The main part of the barn need not be clap-boarded. So long as the roof is tight and the hay does not get wet, it is no injury to the fodder to have it well ventilated. This ventilation is indeed beneficial and necessary to carry off from the fodder the effluvia from the manure in the cellar.

Cheap Barn Cellar.—But comparatively few farmers (as compared to the masses) have yet been convinced that it will pay to construct a root-cellar, and then to raise the roots to fill it with, but for all that, those who have provided themselves with cellars find they pay. As it is not always convenient to have one beneath the barn, it may be built above ground as follows: Dig down three feet the size desired; twelve by twenty feet makes a good large cellar; and ten by sixteen feet will do for six or eight hundred bushels. Get on hand a lot of small logs or poles from six to ten inches in diameter, with which to build the portion above ground. Cut the poles for each side three feet longer than the width or length of the excavation. Place the first two poles on flat stones or blocks back a foot from the edge of the hole dug, and upon opposite sides. Flatten the ends with the ax and lay two cross poles as you would in starting a log house. In these end pieces one foot from the end cut notches for the next side poles to lie in. With each round, set the side poles in a foot, which will give a regular slant to the roof, and make a very strong frame for the weight that is to come upon it. The end that is to contain the door should be carried up straight, while the other may be slanted up, as the sides.



A CONVENIENT BARN.—FIG. 2.

Cover this frame with cull or common lumber, laying the boards on up and down. Next put on a heavy layer of marsh hay or straw to keep the dirt from coming in contact with and rotting the lumber; over this put a foot of earth. A shute should be provided for filling the house, and a small ventilation flue for winter. The end where the door is located should be

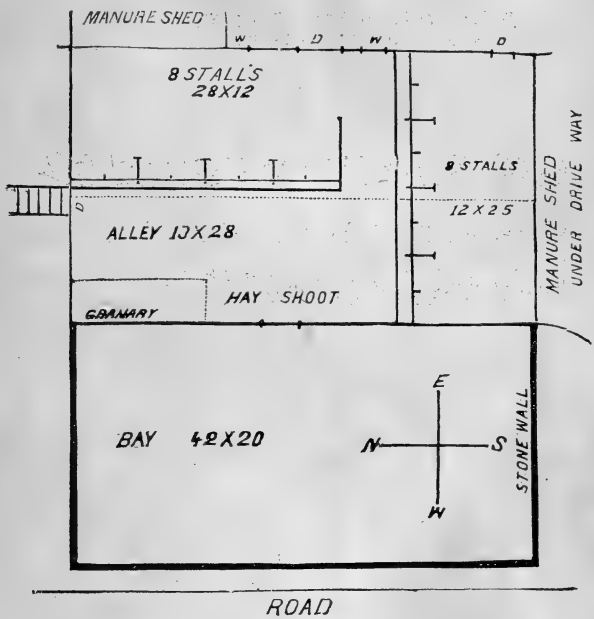


AN OLD BARN IMPROVED.—ELEVATION.

double boarded and filled in between with saw-dust or cut straw; there should also be a double door. A storing house of this kind, if well made, will last eight or ten years, and give as good satisfaction as one costing $200.

How an old Barn was Improved.—We present herewith a brief description of how an old barn was remodeled and greatly improved without much expense, and furnish illustrations showing the barn after the changes

had been made, and the plan of the basement underneath in detail. By a careful study of this plan, our readers may be able to gather some valuable hints and suggestions. The original building was the common 32x42 feet barn, with fourteen posts, a fourteen-feet floor in the middle, with bay on one side and stable on the other, with a lean-to of thirteen feet in the rear, the building standing on the line of the road and facing the west, the grounds descending say one foot in thirty to northeast. It was first raised so that the northeast corner would clear six feet, dug out to a level of one foot below that of the lowest corner; then a ditch was dug one and a half feet below that under the outside sills, all around which was filled with



AN OLD BARN IMPROVED.—PLAN OF BASEMENT.

small stone. A substantial stone wall was laid on the west side, and twenty feet on both north and south ends; the rest of the building was double-boarded save where protected by other buildings. The front doors were then closed, the floor taken up, cut out the bay girts, and laid off a floor of twenty feet on the west side (space reaching from the ground to roof), made a floor twelve feet wide in upright and all of lean-to—in all twenty-five feet, and cut a door in south end. The bay now would hold more than the whole barn before; a large floor, 25x42, thirteen feet of which can be used to store grain, and a space of 25x42 feet for stable. A good idea of the interior construction may be obtained from the illustrated plan of the basement.

Hanging Barn Doors on Rollers.—The great convenience of sliding or rolling doors on the farm outbuildings is well known, and as every farmer with a little ingenuity can construct them himself, there is no reason why they should not be generally adopted. Our illustration, Fig. 1, represents the sliding doors, completed, as applied to the barn; Fig. 2, the manner of applying the rollers to the doors and track. The rollers, track and other trimmings may be obtained at any hardware store. The track is first securely fastened to the edge of an inch or two-inch board, about four or five inches wide. This is then firmly nailed or spiked to the building, parallel to and even with the top of the doorway, and should extend the width of the door on each side. In order that the doors may run easily, the track should be laid as level as possible, and upon one board. The manner of fastening the rollers of the doors is clearly shown in the engraving Fig. 2. The doors are placed upon the tracks at the ends of the latter, and are prevented from running off by placing a block at the end of the track or upon the side of the door. The track should be protected from the weather by some kind of covering. Two narrow boards nailed together similar to an eaves-trough, and fastened to the building above the track and rollers, form the best kind of protection from snow or rain.

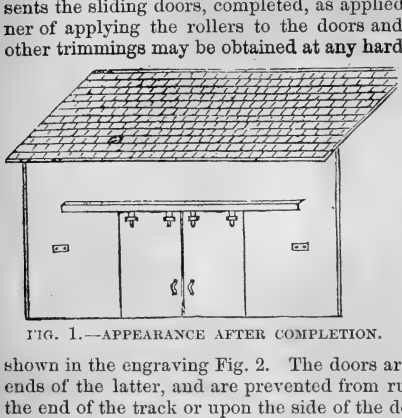


FIG. 1.—APPEARANCE AFTER COMPLETION.

Model Carriage-House and Stable.—Our engraving of the elevation, on the following page, shows doors of the rectangular, carriage-house portion of the building; also door to hay-loft. The carriage-house doors are folding, and open outward, as they can be made closer when hung on hinges than when hung on rollers; and as it is desirable that all doors and windows should be as close as practicable, that they may not affect the ventilation, the ingress of which is provided for by a subterraneous air duct, seen at A, in the ground plan.

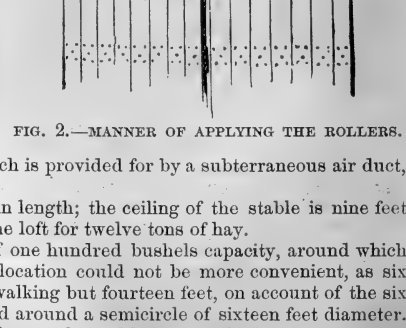


FIG. 2.—MANNER OF APPLYING THE ROLLERS.

The posts are sixteen feet in length; the ceiling of the stable is nine feet in the clear, with storage in the loft for twelve tons of hay.

The oat bin is a cylinder of one hundred bushels capacity, around which circular stairs are built. Its location could not be more convenient, as six horses can be fed grain with walking but fourteen feet, on account of the six stalls being with the head end around a semicircle of sixteen feet diameter. This circular area is open to the cupola, and being supplied with air through the floor, under the stairs, and the animals all breathing into a common cen-

ter directly under the egress, the air is constantly changed without a perceptible current, and it is nearly at the temperature of the earth below the frost and solar influence; no doors nor windows need be opened.

By reference to our illustration of the ground plan, it will be seen that the stall partitions are radial. The stalls are five feet in width in front, and eleven feet at the rear end. The stalls V and VI are arranged with strong gates hung to the wall of the building, in a line with the stall partitions, which, when closed, as seen in stall VI, form spacious, convenient box stalls. There is no partition between the carriage-house, VII, and the stable por-

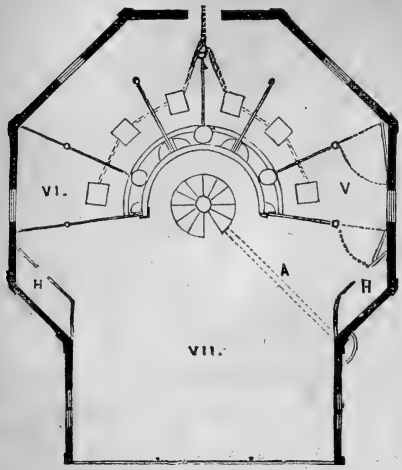
MODEL CARRIAGE-HOUSE AND STABLE.—ELEVATION.

tion of the building, except that formed by the stall partitions and the gates closed, as seen in stall VI.

The ventilation is so effectual that the air of the stable does not effect the carriage-house; and it being arranged with three drive doors, three pairs of horses to carriages may all be driven into the carriage-house at once, and the doors closed behind them, and the horses taken to their respective stalls. There are two harness closets, H, H.

The rectangular figures in each stable floor, are cast-iron drip grates, each covering a sink, or pit, into which the urine falls. These are all connected by pipes, which all connect with a main inner conduit, laid in the

ground by way of the stable door. This conduit discharges into the manure house. The quadrant-shaped figures at the head of the stalls, are hinged iron mangers, which may be turned into the feeding passages for convenience in feeding, and the mangers may be unhinged and removed from the building when cleansed.



MODEL CARRIAGE-HOUSE AND STABLE.—GROUND PLAN.

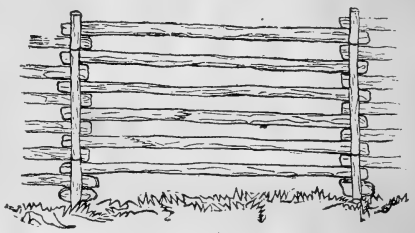
The circular figure in the line of the stall partitions, is the base of a sheet-iron hay tube, which is supported at the height of the manger, and extends to the upper surface of the loft floor, where it is supplied with hay. These tubes have an opening to each stall, so that one tube supplies two horses, the tube being covered at the top, and close, except the feeding openings, and the lattice bottom to them protects the hay from air and dust, and is the most perfect and durable hay-feeding arrangement yet discovered.

The object of the lattice bottom to the hay tubes, is to preserve the hay seed which sheds. It falls into a drawer for the purpose, and the seed thus saved is of excellent quality, and the quantity thus collected well remunerates for the cost of the arrangement. The cupola is octangular, and has four openings, with stationary blinds, and four with glazed sash, which thoroughly light the hay-loft and feeding passage.

The building is perfectly lighted and ventilated, and exhibits a pretty elevation from any point of view.

FENCES AND GATES.

Farm Fences.—In the following list of farm fences we have endeavored to illustrate and describe only those that are of practical value and in actual use by many farmers. They illustrate the various modes of arranging rails for the turning of stock and indicating the boundary line of farms. In many sections of the country the common crooked, zig-zag (sometimes called the Virginia or worm) rail fence is extensively used, and, in consequence of the scarcity of the desired material, cannot be immediately replaced by the improved board, post and rail, iron or stone fence. As commonly constructed, with wide-spreading stakes at each corner, it occupies a strip of ground nearly a rod in width, which is far worse than useless, affording a harboring place for noxious weeds, etc.



FARM FENCES.—FIG. 1.

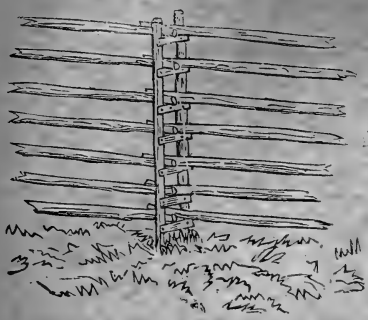
Fig. 1 represents a section of a straight rail fence. The stakes are first driven in the soil from four to six inches asunder, sufficient to admit of a rail of medium size; a stone or block of wood a few inches in height is placed between the stakes, upon which are properly placed two or three rails; a piece of annealed wire is then placed around both stakes, the ends being well twisted together, upon which are placed rails until within a few inches of the top, when another bit of wire, a wooden pin, or a wooden cap, as most convenient, is attached.

In building this class of fence, it will be necessary to cut away with an axe a portion of each end of many rails, that they may fit closely within the stakes. In this, as well as other rail fences, the largest and heaviest rails should be reserved for the top, rendering their removal by unruly stock and high winds less easy. Keep the crooked ones in a panel by themselves, and if they are very crooked it is policy to use them for stakes, or consign them to the flames; for to have a fence to please and not to provoke the intrusion of stock, use none but *straight* rails.

When economy of rails is desired, immediately after setting the stakes cast up a ridge of earth by plowing two furrows on each side, throwing up the second furrow with a shovel, making a ridge a foot or more in height, and not less than a foot in breadth at the top; proceed as above in the construction of the fence; sow grass seed upon the ridge. This plan saves two rails to a panel, renders the stakes more firm and less liable to heave by the action of the frost, and unruly cattle do not have the same advantage in attempting to get through or over it. In situations not liable to the prevalence of high winds, this is the fence that should be used, occupying less

ground than many other kinds; and, when properly constructed, it is a substantial and neat fence.

Fig. 2, though in appearance somewhat resembling the previous one, is more expensive, and is designed especially for the use of poles or slender rails that it would be impossible to properly arrange in a fence by any other plan. To the stakes are nailed cleats, as shown, from four to seven at every set of stakes. Size of rails and purpose of fence will decide this point. A ridge of earth can be thrown up as in the previous plan, with a corresponding economy of timber.



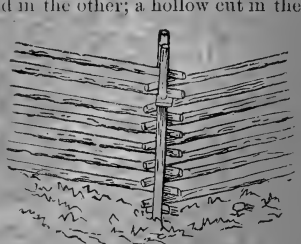
FARM FENCES.—FIG. 2.

Fig. 3 exhibits a mode of staking a zig-zag fence. After the foundation has been laid, the stakes should be driven; holes should be made with a crowbar to the depth of twenty inches at least. One man, standing on a box or bench, drives them with a sledge-hammer or common wooden beetle, while an assistant keeps them upright. Make all the holes before you commence driving the stakes, which should be all sharpened, and the top end reduced to a size admitting the caps to pass over them readily before they are brought to the field.

When the fence is made four or more rails high (the size of rails, etc., will govern), the caps are put upon, and the fence finished by the addition of two or three more rails.

In localities where caps are expensive or difficult to obtain, good annealed wire, size 10, will answer all purposes. It should be drawn tightly up around the stakes; it will bury into them, and the weight of the rails above the wires will rest upon the stakes, having a tendency to keep them in the ground when acted upon by the frost.

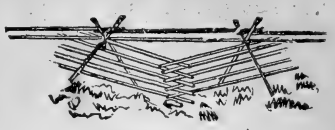
The most expeditious manner in which to sharpen stakes is to have a large, flat block of wood for the stake to stand on, which is held upright with one hand and sharpened with an axe held in the other; a hollow cut in the upper surface of the block will considerably expedite the operation. Hop poles, stakes for grape-vines, etc., are best sharpened in the above manner.



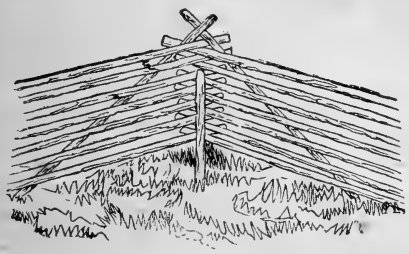
FARM FENCES.—FIG. 3.

In Fig. 4 is shown the best plan known for staking the common rail fence. It dispenses with stakes at the corners, and in consequence of their central position, they are not liable to be broken or loosened while plowing; nor does the fence occupy as much land as by the old mode. In consequence of the central point at which the stakes cross the upper rail of fence, it is required to sustain the weight of the stakes and riders; therefore, this part should be made strong and durable, of well-seasoned material.

Fig. 5 represents a plan of bracing a rail fence, whether it be staked and ridered, staked and capped, locked and ridered, staked and wired, or wired and pinned, all of which kinds of fence are easily blown down by a heavy wind, rails broken, stock let into fields of valuable grain, time spent, and patience exhausted in rebuilding them. The manner of using the arrangement is clearly shown in the figure. It consists in placing on the inside leeward corner a piece of rail, one end resting upon the ground, the other placed underneath the third rail from the top. A fence braced as shown has stood five years without repairing, while a locked, staked and ridered fence by the side of it has been prostrated three times, although in a less exposed situation, thus demonstrating the value of this attachment when used in connection with the common rail fence.



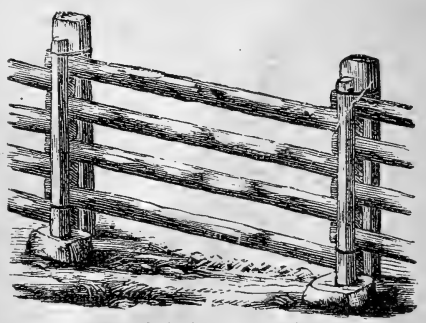
FARM FENCES.—FIG. 4.



FARM FENCES.—FIG. 5.

Straight Rail Fence.—We present a section of straight rail fence, which will be found easy and cheap to construct, and economical in saving timber and occupying space on the land.

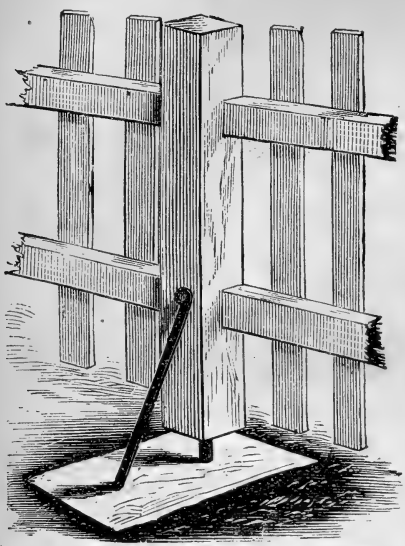
In constructing this fence good posts should be firmly set at such distances apart as will admit of the rails reaching from the center of one post to the center of the other. If necessary, straighten the face of the posts with an axe, and hew down the ends of the rails to a uniform thickness. These rails are fastened to the posts by means of a stake, which rests on a stone or block of wood, and is firmly wired at the top and bottom to the post. In constructing the fence it is better to wire the bottom of the stake first—at the proper distance—and the top rather loosely, so as to admit the rails easily. When the rails are laid up draw the top wire tight, and if proper care has been taken in straightening the face of the post, hewing the ends of the rails, etc., the work will bind together very tightly.



SECTION OF STRAIGHT RAIL FENCE.

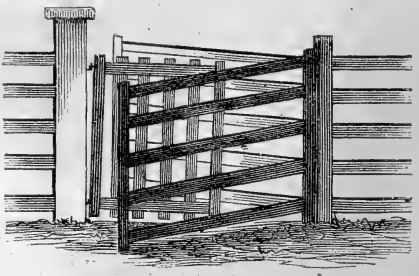
The fence will last as long as the posts; it is strong, requires no nails, nor any more wire than to stake an ordinary crooked fence, and it takes but little over half the posts necessary for an ordinary board fence.

Durable Fence Posts.—We give herewith a drawing and description of a fence post which we think will last one's life-time. The bottom of the post is formed of a stone—some kind that will drill easily—about eight inches thick and twenty long. In this stone two holes are drilled, one an inch and a quarter in diameter and three inches deep, and the other, half an inch in diameter and two inches deep; the holes should be about one foot apart. Bed the stone in the ground nearly level with the surface, with the small hole on the inside of the fence. Next take a scantling four inches square and three feet long, and put a bar of inch and a quarter iron into one end, lengthwise, about six inches. The end of the bar should project four or five inches. Place this into the largest hole in the stone, hold it plumb, turn in melted brimstone, and you have a post. Bend the end of a rod of half inch iron, and fasten in the other hole in the same way; the other end should be flattened and attached to the scantling with a stout screw. The bar should set tight in the post, and about one inch space for air should be left between the scantling and stone.



DURABLE FENCE POSTS.

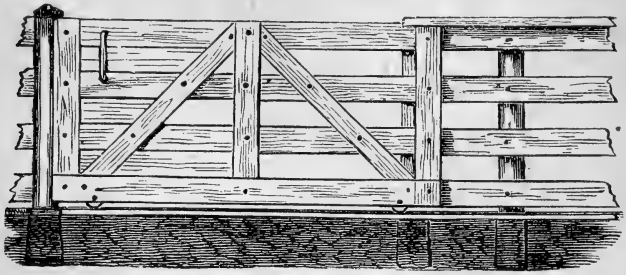
Always-Ready Gate.—We give an illustrated plan of an always-ready gate—a small gate for a barnyard or elsewhere, where a passageway is much used. It is very convenient. This gate swings in a V-shaped inclosure, or in two sides of a triangle. Having the top hinge the longest and the post plumb, the gate, at rest, always hangs in the center, and rightly constructed will always leave a passageway of two feet. Cattle cannot get through it, nor do we think sheep will pass it. It is always shut and always open. It requires no watching to keep it closed, and will be found convenient in many ways.



ALWAYS-READY GATE.

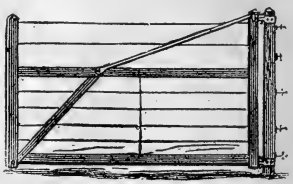
A Good Farm Gate.—We present herewith an engraving of a good and serviceable farm gate, which may be easily and cheaply constructed as follows:

Four posts are set firmly in line, so that the front will be true. Measure fourteen feet, on line with those already set, and set the post the gate shuts against. Then place the sill for the gate to run on, fourteen or sixteen feet long, put down solid. The sill for the gate to run back on can be made of any light material that will sustain the weight of the gate. The sill should have about one inch down grade toward the shutting post, and be spiked fast to



A GOOD FARM GATE.

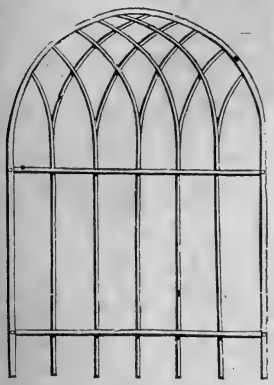
the posts. The gate is made of any width lumber, and long enough to lap four inches on the shutting posts, and about two feet on the groove post, to keep it shady. At the bottom, the gate must have two boards to support the bolts that the rollers turn on. These rollers should be six inches in diameter, an inch thick, to run on half-round iron, placed at a proper distance from the bottom board of the fence, so as to let the gate pass without rubbing. The iron rod should have holes punched so as to let twelve-penny nails through to nail to the sill, about two feet apart. Nail down the rod and it is ready for the gate. The gate is put together with *sixteen* two and one-half inch bolts and eight three and one-half inch bolts; the three and one-half inch bolts go through three boards at the bottom. The rollers (as per drawing) go between the bottom boards close under the brace, so as to get the bearing; the bolts should fit the rollers as tight as possible. These rollers in their place, put up the gate on the rod, and run it back on the fence; mark the four posts one inch above the top of the gate; saw them off square, in line; place on top of the posts a joist twelve inches wide, two inches thick; let it project over in front of the gate far enough to clear it; now nail a six-inch strip on the edge of the joist, so that the top edge will be even with the top side of the joist; the four inches projecting down will serve as a groove for the gate to run in and keep it in its place; now spike the joist to the top of the post firmly; let the gate lap on the shutting-post about four inches on half the posts; then nail the ends of the boards to the post occupying the other half, so that the gate will shut against the butts, which will help sustain the post; now nail a board solid in line with the butts, and thick



A CHEAP GATE.

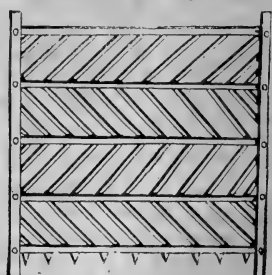
enough to project a quarter to a half inch from the gate; nail a stout board on the previous one, and let it project over about three inches toward the gate, and in line with the post, so as to make a groove for the gate to stand in. If it is properly shaped the gate will jam in it and remain solid until it is removed back.

A Cheap Gate.—This gate, illustrated on preceding page, is designed merely for farm use. Wood and metal or wire are combined in a novel manner in its construction. It may be cheaply made by unskilled labor, and combines lightness with durability. The gate is composed of two wooden uprights, one at the hinge end and the other at the free end, two horizontal rails and an oblique brace connecting the rods. An iron brace connects the upper end of the inner upright, and is provided with an eye which receives the pintle of upper hinge. Wires are stretched between the uprights, forming a complete panel. This gate is very light, and at the same time simple and strong.



FANCY GATES.—FIG. 1.

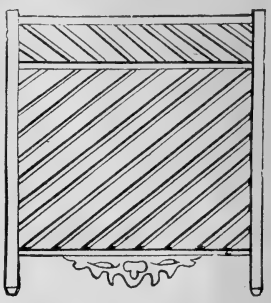
Some Fancy Gates.—For the benefit of such readers as may be contemplating the luxury of a new front yard or garden fence, or, in fact, an ornamental fence of any description, we present on this and the following page four neat and ornamental designs of cheap, fancy framed gates, which any carpenter can make, and which may be used appropriately with almost any style of picket or even with iron fences. These gates are usually made three feet six or eight inches wide. The space between the posts for an ordinary door yard gate should be three feet ten inches. That is, however, a matter to be decided by convenience, and the use to which it is to be put. A wide gate is more convenient than a narrow one, especially where baby carriages and wheelbarrows are much used, and the gate is employed as a common and general entrance and exit by the family for all purposes.



FANCY GATES.—FIG. 2.

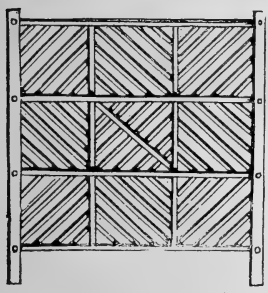
To Preserve Fence Posts.—A correspondent at Benton Harbor, Mich., sends us the following statement by Parker Earle (a widely known horticulturist), in the Chicago *Times*, and requests our opinion of his mode for preserving fence posts. In answer, it may be stated that no single experiment, or no single series of experiments under like circumstances, can be adopted as a rule for unlike conditions. For general application, we would recommend first impregnating the whole of the post with crude petroleum as a general preservative, and when dry apply hot tar to the portion going into the ground, but none above. The petroleum will penetrate the pores, and the tar coating will hold it there. The following is

Mr. Earle's statement: "In building a fence around our young orchard, several years ago, we tried many plans for preserving the posts. Having occasion to remove the fence this winter, we noted the condition of the posts as follows: Those set with no preparation were decayed an inch or more in thickness; those coated with a thick wash of lime were better preserved, but were quite seriously attacked by worms; those posts coated with hot tar were perfectly sound as when first put into the ground; those painted with petroleum and kerosene were equally sound, and as good as new. In future we shall treat all posts in the following manner before setting: Let the posts get thoroughly dry, and then, with a pan of cheap kerosene and a white-wash brush, give the lower third of the post, the part to go into the ground, two or three good applications of the oil, letting it soak in well each time. Posts so treated will not be troubled by worms or insects of any kind, but will resist decay to a remarkable degree. This we find to be the simplest, easiest, cheapest, and best method of preservation."—*Country Gentleman.*



FANCY GATES.—FIG. 3.

Easy Method of Taking Up Posts.—Wishing to take up fence posts, which were sound, and standing solid in heavy clay soil baked hard by drouth, a correspondent made his head save his muscle: "I found that by pouring a pail of water around the post it may be very readily loosened by the hand. Then by hooking a chain about it loosely, slipping the noose down as far as possible below the surface of the ground, and hooking the other end of the chain around a piece of light scantling, near the center, to act as a lever, the post may be lifted out of its bed very easily."



FANCY GATES.—FIG. 4.

A Good Fence.—Raise black walnut posts on the lot where they are wanted. If they grow fast they will do in from five to seven years. Use the barb wire. Black walnut injures crops less than almost any other tree. No stock will gnaw or hurt it. The roots run straight down, so you can plow against the trunk. It grows straight and tall, and has but few limbs. The working of the tree will not break the wire. Black walnut will pay all expenses in a few years in fruit.

Post and Rail Fences.—We give herewith plain directions, with appropriate sketches, which we think will enable any ordinarily skillful farm-hand to make the simple machinery necessary for boring the holes in the posts, mortising them out, pointing the rails, digging the holes in the earth, and putting up a good and substantial rail fence. The posts are 7 1-2 feet long for a six-rail fence, which is the best and most generally used, and 3 to 4 inches thick by 7 to 8 inches wide. These posts are hewn out. The holes in the posts are oblong (up and down the post), and in size are 2 1-2 x 6 inches,

The rails are 9 1-2 feet long, and 5 to 6 inches wide by 2 to 3 inches thick on the bark edge, and a quarter to a half inch thick on the other edge.

In building the fence the bark edge is placed *down*, as the thin edge sheds rain or snow more readily, which prevents rotting so rapidly. The rails lap in the holes about five or six inches, as shown in the section, Fig. 4.

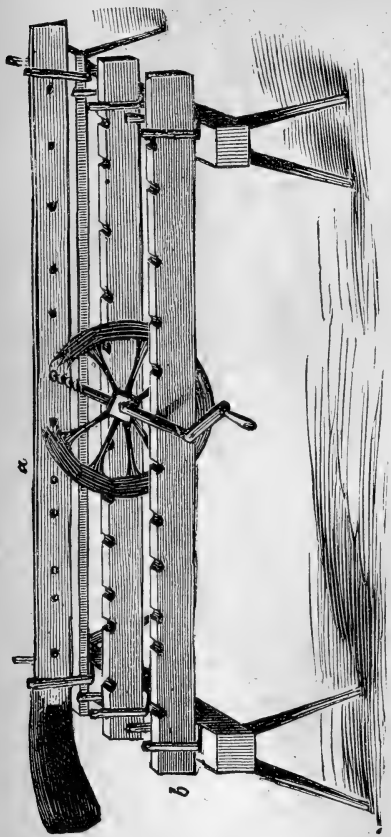


FIG. 1.—TRESTLE FRAME USED IN BORING THE POSTS.

In making the posts the timber is cut into proper lengths, and then split in proper size and hewn, leaving the ground end for two feet rough and unhewn, giving a stout base. This part of the work is done in the forest, after which they are hauled home, and put in piles ready for boring. The mode of making the oblong holes in the post is shown in the cut (Fig. 1), *a* representing the post, *thin edge up.* Two holes are bored with a two-and-a-quarter-inch auger at the points shown by the holes in the post on the trestle at *a*. The auger holes are six inches apart *from outside to outside.* The trestle frame is made of stout timber and planks, as shown in the figure. The planks are put on the benches edgewise, and fastened with stout pins. A plank is placed from one bench to the other for the post to rest on, and these benches are eleven and a half feet apart. In the two planks it will be seen that notches are sawed at points to correspond with the holes to be made by the auger. These notched planks are placed thirteen or fourteen inches apart, to enable the round or square wheel (see Figs. 1 and 5) to run easily in between them. The post is held on the plank firmly by stout wooden pins and wedges. The bottom hole in the post is made two inches above the ground level. The next hole is three inches from the top of the bottom hole; the next four inches above that; the next is five above that; and the top hole is six inches above the one below it. In boring the holes the auger, which is firmly fastened in the wheel, must be moved (wheel and all, of course) into the proper notches, and in this way every post is bored

alike, and all the holes in the post are the proper distance apart. After your posts are bored, the next step is to have a narrow-blade axe, with a short handle, as shown at *c*, Fig. 2 (a common axe, would do, however), and with this mortise out the holes, which is done by laying the post flatwise on the ground, or on a stout, low trestle, similar to the "pointer" shown at Fig. 3. When one side is mortised half out, turn the post and finish. A good hand will bore and mortise fifteen posts a day with these tools. The rails for this kind of a fence are split out in the woods, 9 1-2 feet long, all of the same length. A good hand can cut down the timber and split out one hundred of them in a day, in fair timber. They are hauled home generally before being pointed. The ends of the rails should fill the holes as nearly as possible, so as to exclude moisture, the tighter the better. Pointing the rails is simple work. Two short-legged, stout trestles of any rough logs are placed about eight feet apart, as shown at Fig. 3, in each of which two large wooden pegs are driven to receive the rail, and between these pegs the rail is placed, *thin edge up*, and fastened in between the pegs with wedges of wood. They are now sharpened off to about an inch thick for six to eight inches, the corners slightly nipped, and the work is done. A man will point over two hundred in a day.

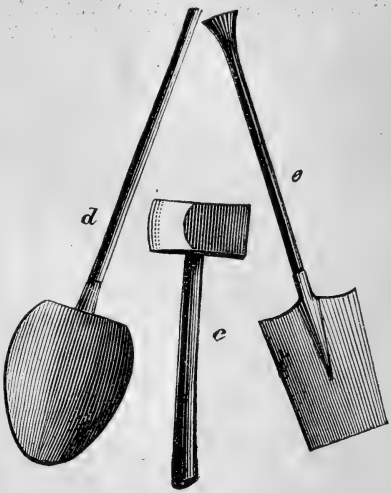


FIG. 2.—SHOVEL, AXE AND DIGGER.

To make holes in the earth, a digger (see Fig. 2) is used. It is about ten inches long by five wide, made perfectly straight, and to weigh, handle and all, about twelve pounds. It is made of good iron, laid with the best steel. Any blacksmith can make one. They cost about $1.50, without handle. The handle should be six feet long, and heavy. A club at one end would do for a rammer to run the dirt in the holes. In making the fence, set the first post firmly, and slip in one end of the rails, as shown at *a*, in Fig. 4. After the next hole is dug set the next post in, and before you put in the dirt place the other end of the rails in on both sides, and drive; then fill up and ram firmly, and so on to the end. Drive the rails with a wooden maul. Never use an axe. When you come to a corner, you must have a large post with


FIG. 3.—TRESTLE FOR POINTING THE RAILS.

holes in the sides—the other holes only half way through the post—to receive the turn rails. In digging the holes, a little practice will enable you to throw out over half of the dirt with the digger (see Fig. 2), especially if the earth is tenacious. After that a long-handled, small scoop shovel, as shown at *d*, Fig. 2, will be found serviceable.

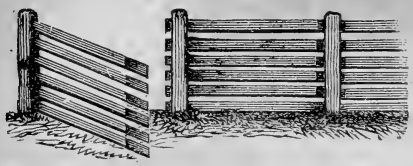


FIG. 4.—SECTION OF THE SIX RAIL FENCE.

We neglected to say that the handle to the auger is about 3 1-2 feet long, and can be, as it usually is, fastened on by a blacksmith. The square wheel shown in Fig. 5 is easily made, and is about 5 feet in diameter. The trestle (Fig. 1) is 3 1-2 feet high. The auger is put in the wheel and hung on the trestle precisely like an ordinary grindstone. As to the best materials for this fence, black locust is the best for posts, mulberry next, then white oak. For rails, white oak, ash, walnut, and cottonwood, in the order named.

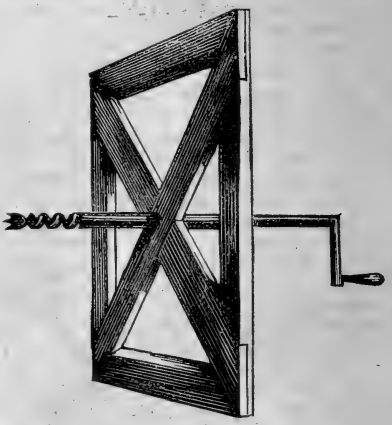
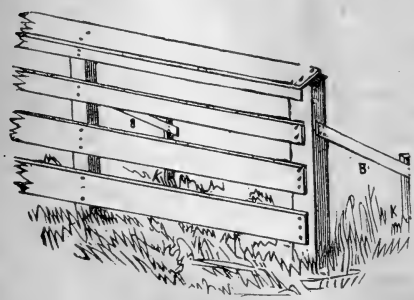


FIG. 5.—AUGER WHEEL.

Fence for Marsh or Soft Soil.—The improvement we herewith illustrate is designed for bracing the common board fences built across low, marshy ground, that is overflowed at every fall of rain. The work, or face side, of the fence is supposed to (and should) front up-stream; in the rear, and four feet from each post, is firmly driven into the ground a stake (K), left projecting one foot above the surface. This stake is connected with the fence-post by strip (B), as indicated. The strength of the fence to resist the force of rushing water that may come in contact with it is increased tenfold. Where high winds are prevalent, fences may be braced in this way upon the leeward side.

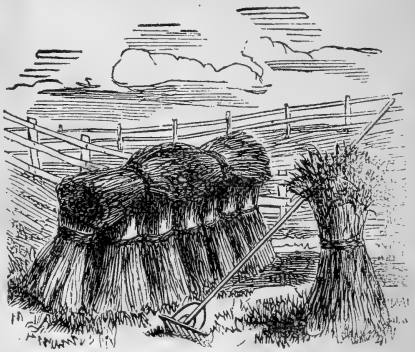


FENCE FOR MARSH OR SOFT SOIL.

FIELD CROPS.

Wheat Shocks.—The illustrations portray the various methods practiced for securing wheat, rye, oats, etc., in shocks, in which position they should be arranged. Wheat should be cut from five to ten days before maturity—that is, when about one-third of the chaff is yet green, or while many of the berries can be mashed between the thumb and finger. The points gained thereby are: By thus early reaping the grain is not as liable to be prostrated by rain or high winds, and is not as liable to shell during the process of gathering. The grain secured by this process, and at the time indicated, is heavier, and the flour is better.

Fig. 1 delineates a large, oblong shock which is made by placing ten sheaves in a double row, the bottom of each pair being a foot asunder, set bracing and meeting at the top, the whole covered by two sheaves, whose ends, each side of band, are so spread that when in position they will afford a more secure protection from rain, and render the liability to derangement in high winds much less.



WHEAT SHOCKS.—FIG. 1.

In Fig. 2 is shown a very good plan for securing a dozen or more sheaves in a round shock. Two caps are used, crossing at right angles above the center of the shock.

Fig. 3 illustrates another mode of capping a round shock. But six sheaves should be placed upright in each shock, unless the straw be of extra length, as in the case of rye. Bind the caps securely near the butts, breaking down all around before placing in proper position. The latter is a mode seldom practiced, yet highly recommended by many farmers. Should the sheaves be damp or contain slowly drying weeds, shock in the manner shown in Fig. 1, which exposes a greater area of each sheaf to the combined influence of sun and air than by any other known process.

Harvesting Wheat.—Wheat, when cut before the grain has passed from the milk to the dough state, will shrivel and give small measure and light weight. The straw will be more valuable for fodder, however, than if harvested later. On the other hand, if left to become over-ripe, the grains grow harsh and rough, and the bran will be so thick and brittle that no after manipulation of the kernels will bring the wheat in condition to make the best quality of flour without carrying a large proportion of flour off with the bran.

The cultivator's safety lies, therefore, between the extremes of early and late cutting. In a word, harvest the crop when the grain has passed from the milky stage to a doughy one. If the wheat be cut when the grain reaches the dough state, the bran will be thin and elastic, and can be separated more readily from the flour than when dead ripe. In addition to the flour being finer, it will also be increased in quantity in consequence of the bran being lighter than when ripe. A saving of wheat is likewise gained, which otherwise would be lost by shelling in the field.

HEAT SHOCKS.—FIG. 2.

The novice can ascertain the exact time when wheat and other small grain ought to be cut by opening heads in different portions of the field, and examining the kernels carefully. The straw near the ground will also proclaim the time for harvest by its yellow hue.

Wheat cut in the dough state ought not to be dried suddenly. It may be bound and stacked at once, or, if there is only a small quantity, drawn to the barn. Some farmers put it into small stacks. If stacked so that the wind and sun will not dry up all the juices in the plant, enough of these will be slowly concentrated in the seed to accomplish the maturity of the grain in perfection. If by rapid ripening in the sun the kernels are shrivelled, more bran is formed in proportion to the flour.

A large class of farmers practice threshing from the shock and hauling grain direct to market. The advantages of this plan vary with the season. When the wheat has been bleached out by hot suns and repeated rains, it should be stacked and go through the "sweat." During this process the straw and grain become damp and heat is evolved. At such times the grain cannot readily be threshed, therefore it is not advisable to attempt it until both straw and grain are dry. Then it will be found that the berry has been restored to color and exhibits a plump appearance, having absorbed nutritive matter from the stalk. The grain has not only undergone a change for the better, but the straw is also improved in quality.

WHEAT SHOCKS.—FIG. 3.

It is suggested that farmers take time to look about for extra fine heads of wheat for future seed. It will also be wise to carefully note the results of

the several varieties grown, with a view to comparing their respective merits, and selecting for another year's crop those sorts which promise best returns. When fertilizers have been used, it will also be well to mark the results. It is only by a careful comparison of different plants under different treatments that a farmer surely arrives at conclusions which best suit the special requirements of his land and his location.

How to Stack Straw.—We give an illustration showing how straw can be stacked so that it will be preserved from spoiling, and at the same time answer for a shelter to protect stock from the storms. The pen should be two or three logs high (or higher, if the logs are small), and large enough to correspond with the quantity of straw. Then set fence rails or poles all around inside of the pen, as represented. It can be built at the tail end of the threshing machine, so that the straw can fall in it. It will require less hands to stack.

HOW TO STACK STRAW.

Draining Wheat Fields.—If no other method has been devised for draining wheat fields, which are sometimes too wet, it will pay to plow furrows from the lowest spot to some lower point outside. Every experienced wheat grower knows that if water is allowed to stand upon the ground late in the fall, the crop will not only be directly injured thereby, but will also be liable to be severely damaged by "winter killing," and it should be the aim to prevent, as far as possible, both of these evils. A heavy rain will do little damage to a wheat field if provision is made for the prompt removal of the surplus water, while a moderate rainfall upon undrained land which is already too wet will cause the destruction of many of the plants, and largely reduce the possible yield of the crop. While thorough drainage is much better than any makeshift which can be invented, it is much better to adopt the very imperfect plan recommended above than it is to make no provision for the protection of the crop from injury by an excess of moisture in the soil.

Weevil in Wheat.—A correspondent of an agricultural paper says: "Some years ago, hearing complaint of weevil in wheat about the close of harvest, when I was ricking my wheat, I got fresh slaked lime and threw over the rick in building it—laying two courses of sheaves, then lime sufficient to whiten the stack. A neighbor who threshed his wheat from the shock came to me a few days after, and said he should lose his wheat, for it was alive with weevil. I told him to throw lime over it, and shovel it through his wheat, which he did. Two days later there was not a weevil seen in it,"

Wheat Maxims in Small Compass.—The following information about wheat growing has been condensed: 1. The best soil for wheat is rich clay loam; 2. Wheat likes a good, deep, soft bed; 3. Clover turned under makes just such a bed; 4. The best seed is oily, heavy, plump, and clean; 5. About two inches is the best depth for sowing the seed; 6. The drill puts in the seed better and cheaper than broadcasting; 7. From the middle of September to the last of October is the best time for sowing; 8. Drilled, one bushel of seed per acre; if sown broadcast, two bushels per acre; 9. One heavy rolling after sowing does much good; 10. For flour, cut when the grain begins to harden; for seed, not until it has hardened.

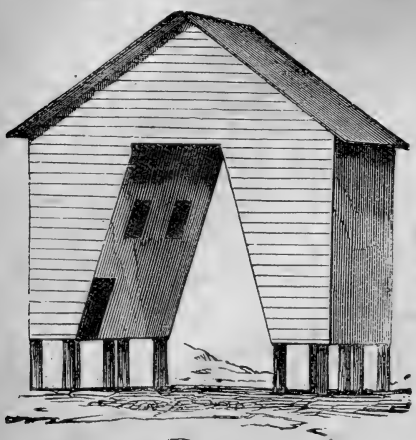


FIG. 1.

An Ohio Corn Crib.—We give an illustration (Fig. 1) of a very convenient and substantial double corn crib, with a wagon shed between. Such a crib can be built any size, and filled with grain, without the least sign of weakness. One is a brace for the other, and the more grain you have in it the firmer it will be. It is useless to explain how the timbers should be put together, and where every door should be cut out, when one glance at the illustration will answer. Fig. 2 represents the double doors made to correspond with the entrance of the shed. The doors, when shut, are fastened to a piece of scantling, standing perpendicular—one entering the beam, the other entering a block put in the ground. The foundation can be of wood or stone, as suits best. This is what we call the "Ohio Dutch Yankee corn crib."

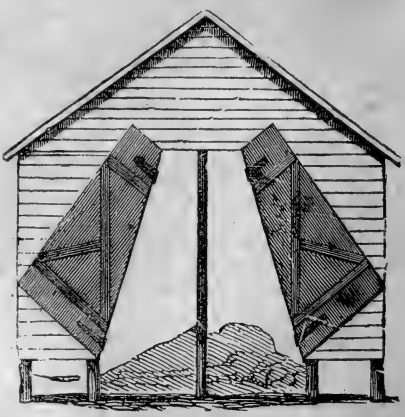
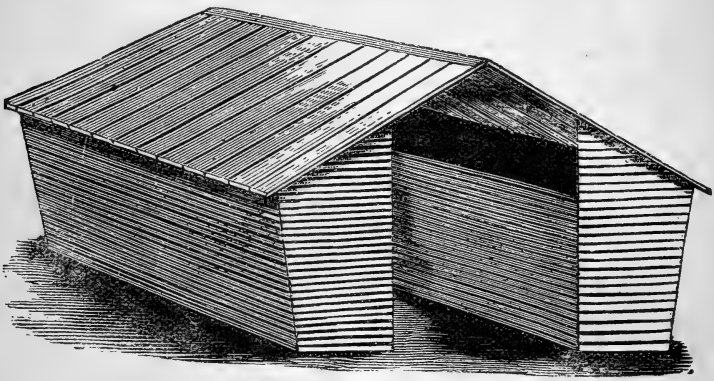


FIG. 2.

Hilling Injurious to Corn.—Careful experiments have proved that corn which is hilled will blow down more readily than that which has level culture. This can be accounted for by the fact

that corn roots run very near the surface, and when hills are made they are confined to the small space covered by the hill; while in level culture the roots run from one row to the other, thus enabling the corn to stand strong, as nature intended, and in no way liable to be blown down, except by winds of unusual violence.

A Convenient Corn Crib.—We illustrate a very convenient style of corn crib, which, while costing but a mere trifle more than an ordinary crib, possesses some of the main advantages of a corn house; namely, a space protected from the weather sufficient to accommodate a team with a wagon load of corn. At the proper season the grain may be shelled therein, and it is an excellent place to shelter a lumber wagon. The plan needs but little explanation. It is simply two cribs placed side by side, and facing each other. The cribs and space between them are covered by one roof. The cribs should be about four feet wide at the bottom, and grow broader as they rise, the taper being on the outside; the projecting roof throws the water clear of

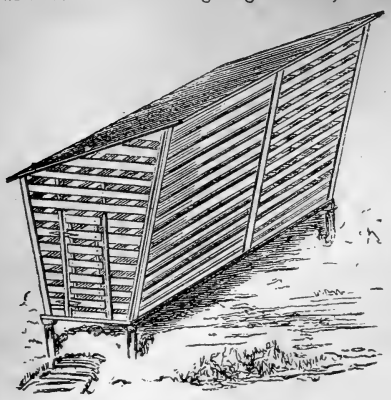


A CONVENIENT CORN CRIB.

the crib. The height should be sufficient to allow easy shoveling of the corn from the wagon into the top of the crib. If one wishes to make it rat-proof, it may be elevated on posts, capped with inverted tin pans; but in that case it would hardly do to store tools in it. Some would suggest a floor and doors, which can easily be added to the plan, if desired. The best material is sawed scantlings for a frame, and three or four-inch-wide strips for siding. The roof may be made of matched boards. In case it should be determined to floor and hang doors, it would be well to board up the inside of the crib with matched stuff to the height of the eaves.

Seed Corn.—No one will deny that great care should be observed in selecting seed corn to plant, and yet numbers of farmers never see their seed corn until it is carried to the field at planting-time. We think the best plan is to place a barrel in a corner of the crib, and throw in it every large and vigorous ear. Shell off about two inches of the large ends, in order to get the largest and most prolific grains. This produces a large and healthy plant, that grows much faster than small ones do. Many farmers may think it quite a tedious job to select every ear of corn planted in this way; but they

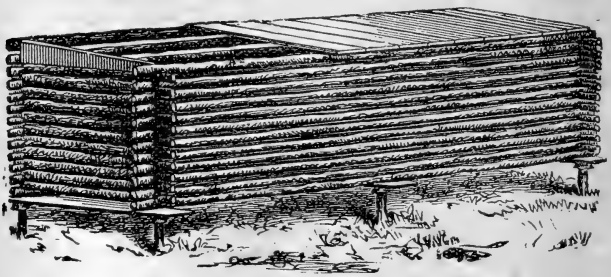
will not find it so after giving it a trial, and selecting as much as possible on rainy days. This plan, once adopted, will ever be adhered to afterward. Try it; you will not regret it, but find it remunerative.



CORN CRIBS.—FIG. 1.

Cheap Corn Cribs.—There are many farmers who follow a mixed husbandry, and who raise comparatively small quantities of corn, who cannot afford to pay much for structures used for this purpose. For such we herewith give directions, accompanied with drawings, showing how a cheap and yet suitable crib may be made.

The elevation (Fig. 1) is an excellent crib. The sills are four by six inches, framed; if only a small crib is needed, it will only be necessary to bore two-inch holes at each corner, and one intermediate, and insert sharpened sticks three inches square, to which secure slats horizontally, three-quarters of an



CORN CRIBS.—FIG. 2.

inch apart. As this structure has but one door, it is best to divide the room in two parts, the best or sound corn to be put in the near compartment, and the poor corn in front, where it may be first fed out. A still cheaper plan

CORN CRIBS.—FIG. 3.

of construction is to use poles or small logs, secured together in the form shown in Fig. 2. This is an exceedingly cheap and expeditious manner of constructing a corn crib. If properly done, it will last for years, is easy of

access, and, with a good cover, corn will keep in it as well as in those more expensive.

Fig. 3 gives a side view of a crib constructed of poles or logs, showing the manner of splicing at A, A, the logs midway between the supports. Pin or nail the logs at the point of joining. In this way log cribs several hundred feet in length are often constructed.

The Enemies of Corn.—Its enemies in the field, the bin, and the mill are numerous. Among its bird foes the crow is most dreaded by the farmer. He is a bold, saucy fellow, well endowed with bird sense, and soon sees a scare-crow is a humbug. The common devices used for this purpose —an open newspaper, bright tin, a clapping wind-mill, an effigy, etc., are effective only for a short time, when something new must be found. A practical farmer suggests that early planting will circumvent him, since he is not particularly an early bird. Another claims that the use of a planter which covers the seed and presses down the earth upon it has been a perfect defense for him. He has seen twenty crows pulling away after the corn had got above the ground, and found they had nipped the tops off, yet could not get the kernel up.

Great damage is often done to the corn crop by a corn-worm *(Heliothus Armiga)*, identical with the boll-worm, so injurious to the cotton crop. The parent of the worm is a moth of brownish-yellow color, with dark brown or black markings. The caterpillar is green with black stripes and dark spots, and is covered with hairs. When full grown it measures about one and one-half inches. It is extremely voracious, though not particularly dainty, since it eats whatever comes in its way. Peas, stringed beans, tomatoes, pumpkins, cotton or corn are all one to his greedy appetite. The moth deposits its eggs upon the corn silk, and the young caterpillars soon work their way down to the tender kernel. When the caterpillar attains its full size it descends into the soil a few inches and there weaves its cocoon. Two or more broods are produced each year. Birds and parasites destroy this insect both as worm and moth. Men destroy it by means of torches, lamps and lanterns, sometimes arranged over dishes of oil or water, into which it falls and drowns. Plates of vinegar and molasses put among the corn will entrap many of them.

Aphis Maidis, a little plant louse, infests corn and lives upon its juices. The eggs, which are laid in the ground, hatch in May, when the lice gather upon the roots, and here remain until the roots harden so that they are driven to the stem and tassels, where they are found in great numbers about July. Their presence can be easily detected by an army of red ants dancing attendance upon them, since they wear two black honey-tubes standing up like horns on the upper and hinder part of the abdomen, which secrete a saccharine fluid, of which the ants are very fond. They have a curious history of reproduction. The female deposits her eggs in the ground and dies. The brood are wingless females, and without the intervention of the male bring forth alive another female brood.

These do likewise, and so continue for five or six or more generations. The last brood are both males and females. These pair again, and deposit their eggs, which remain over winter in the ground, and the next spring begin the same round over again. It is claimed that nothing but cropping against them is of any avail.

The corn-stalk borer is a comparatively new enemy, or, at any rate, has been only lately described. The moth is of an ashy-gray color, and probable

lays her eggs near the base of the leaf where the leaf is sheathed around the stalk. The worm is orange yellow, with rows of reddish warts, and a flat, black head, with which it bores its way into the stalk. It sheds its skin four times before it attains full growth. The cocoon is woven within the stalk, and the moth makes its exit through the holes bored by the worm. Three or more broods are produced each year. It hibernates in stalks and stubble. The stalks not eaten by stock should be burned early in February, and the stubble should be plowed up and burned, or plowed under very deeply.

Curing Corn Fodder.—Much corn fodder is spoiled while being cured. A good way to prevent this is to set firmly in the ground a small stake or large-sized bean-pole, around which a few armfuls of corn is set, and bound securely near the top. This makes a firm center around which to build. Then set up more corn, placing it evenly all around, and leaning it no more than is necessary to have it stand. When enough is placed to make a large stock, all that can cure, draw a rope, with a slip noose in one end, around the stock as tight as convenient, using a step-ladder to stand upon if the corn is very tall. An assistant can now bind with a straw band or with selected stalks, after which the rope may be removed. If doing the work alone, the rope can be tied while the band is being put on. Corn fodder well put up in this way may be kept, if desired, in the field till winter.

Saving Seed Corn.—To save seed corn successfully in a cold climate, you should not keep it in a warm place, or especially where it is warm but a part of the time, as there is danger that the changes of temperature may destroy the germinative power. Continued warmth is also conducive to decomposition, which will destroy the life of the seed. Corn and similar seeds are best kept in a dry, cool room, where the temperature is uniform. When your seed from the "small pile over the living-room" failed to germinate, the cause was probably due to both dampness and warmth, which incited incipient decay. Seeds differ greatly in the degree of cold they will endure without losing vitality. Corn has germinated after having been subjected to the most intense cold of the polar regions, and an experiment is reported in which other seeds germinated after having been frozen into a cake of ice.

Corn Culture.—"The suckers," says H. M. Engle, in a prize essay, "should, under all circumstances, be taken off before they appropriate too much substance which the main stalks should receive, but under no circumstances allow suckers to tassel, for, whatever pains may be taken to bring or keep corn at its greatest perfection by selection of seed, the pollen from the sucker may undo what has been gained by years of careful selection. I would as soon think of breeding from a scrub male to a thoroughbred animal as to have the pollen from suckers cast upon an excellent variety of corn. It is also well known that the pollen from a neighboring field is oftimes carried to an almost incredible distance, and consequently may cause more mixture than is desirable."

Points on Corn.—Deep plowing among growing corn after the roots have met in the rows is disastrous; "root pruning" is a mistake; to break the roots checks the growth, and in hot, dry weather deep cultivation will surely cause the corn to curl, showing injuring and suffering, while shallow working will keep it fresh and green. As soon as a crust is formed on the soil, it should be broken up to admit both moisture and air, for the one dissolves the fertilizing matter which is in the soil, and the latter effects its de-

composition and renders it soluble. So that after a rain, which has crusted the surface, the cultivator should be started as soon as the soil is dry enough; this tends to hold the moisture and prevent speedy evaporation.

Raising Good Corn in a Dry Season.—"Some Yankee," says a practical farmer, "will ask, 'How do you raise good corn in a drouth?' I'll tell. I plowed and rolled my ground, spread my manure on, and harrowed it in; put a handful of hen manure and fine bone composted in the hill; cultivated it flat; did not hill any. When the drouth came, cultivated, but very shallow; the result was a good crop. On another plot the manure was spread on the sod and turned under without any fertilizer in the hill, and was almost a failure. My neighbors report that they have very fair corn on land that the manure was spread on after plowing and fertilizing in the hill."

Husking.—Some people who husk corn throw the shock upon the ground, spread it out, and go to work on their knees. They know no better. If they will make a frame four feet wide and long enough to hold a shock after it is spread out, with a board in the middle running lengthways to sit on, they will find they have done a sensible thing. The frame may be eighteen inches high, or any other height they may like better.

Cabbages with Corn.—A writer in the *Fruit Recorder* says that one of his neighbors planted some cabbage among his corn where the corn missed, and the butterflies did not find them. He has therefore come to the conclusion that if the cabbage patch were in the middle of the corn patch, the butterflies would not find them, as they fly low and like plain sailing.

Potato Culture.—Destroying the potato beetle, says the *American Cultivator*, and its even more destructive larvæ, has come to be the most important point in the successful growing of potatoes. Paris green is the common agent employed, though London purple is cheaper, equally effective, and has the advantage, when used with water, of being soluble, while Paris green, under similar conditions, is insoluble. It does not follow, however, because these poisons will do the work, that every grower can make them equally effective. In their indiscriminate use the inexperienced cultivator is liable to do more harm than good. The young potato shoot is very tender, and either Paris green or London purple applied in too strong doses will burn the vines. If the vines be injured at this early stage of their growth from any cause, the resultant crop will be greatly diminished.

For nearly all early planted potatoes, when the vine grows slowly, hand picking to destroy the first crop of beetles is very important. It should be performed as soon as the shoots are up, and, if possible, before any eggs are laid. In a potato-growing section, where old beetles from last year's hatch appear by the thousands, this indeed involves considerable labor. In fact, in such a locality it is not easy to grow early potatoes on a large scale. From a few short rows in a garden we have picked up by count between eight hundred and nine hundred beetles on a warm, sunshiny half-day, just as the potatoes were coming up. The next day the process was repeated, with nearly half as many beetles secured, while more or less in number were gathered every subsequent day for a week. It was just at the time the beetles were coming out of the ground, and the garden potatoes being early planted, attracted all the beetles in the neighborhood. It is of little avail to attempt to poison these beetles in the spring. Occasionally one will eat as expected, but the majority are too busy propagating and laying eggs to

attend to anything else. It is the fact that beetles are very numerous in spring, together with the difficulty in destroying them by poison, which frightens so many from the business. The inexperienced grower is apt, as soon as he finds his vines infested, to prepare a dose of poison, making it of very great strength, so as to make certain of killing the enemy. In nine cases out of ten the tender vines are injured, and the beetles are seldom appreciably diminished in numbers. With close hand picking at first, and a reserving of the poison until the larvæ make their appearance, the result is very different and much more satisfactory.

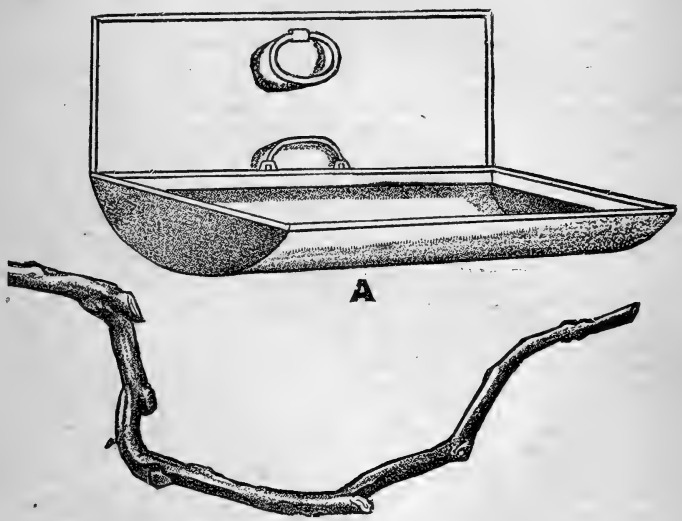
The main crop of potatoes should be planted late—that is, if large quantities are to be grown. Planting a few in the garden or somewhere else, as a bait to draw the first beetles, greatly lessens the subsequent work. Even in the same field the potato beetle is more destructive on some varieties than on others. Those who have grown the Magnum Bonum say it is especially liable to attack. Grown alongside other varieties, the bugs singled out this, while the others largely escaped. It has been suggested that one or two rows of this kind be planted around the potato field as a protection to the main crop. On the other hand, it is said the Early Gem is especially distasteful to the bugs. There is probably some difference in the comparative liability of different varieties to this insect attack. We have generally found, however, that the larger growing varieties and the strongest hills of the same variety are least injured. It is possible to plant on highly-manured ground, with seed so vigorous that its rapid growth will largely reduce the cost of fighting the bugs. The female beetle instinctively chooses a vine that is a feeble grower on which to deposit her eggs. Where the vine is full of sap, either the eggs will not be laid or many of them will fail to hatch. We hope very much, from the results of recent experiments, in discovering the true way to cut potato seed. If the proper cutting of potato seed will insure greater vigor or growth, many of the difficulties in fighting the potato beetle will be overcome.

It should not be forgotten that the potato grower has insect friends as well as enemies. All kinds of lady-bugs eat the eggs of the potato beetle. It is the abundance of these lady-bugs about old apple orchards that often makes potato growing successful near an orchard when the field crop will be entirely destroyed. There are several varieties of insects that prey on the potato larvæ. Farmers who use no poison sometimes find dead potato bug larvæ on their vines. These dead specimens should always be left undisturbed, as in all probability they are filled with eggs of the parasite that has destroyed them, only needing opportunity to hatch and continue the good work. On general principles, if any insect is found in the potato field whose habits are not known, it is best to leave it undisturbed, since it is quite probably a friend engaged in destroying the farmer's enemies. Entomologists have discovered thirty or more insect enemies of the potato bug in its various stages of growth, and there are probably others not yet known. But for these friendly insects difficulties in growing potatoes would be much greater than those which now prevail.

Phosphate for Potatoes.—Wm. T. Woerner, of New Brunswick, N. J., writes: "In planting potatoes I have used no other manure than phosphate of some reliable brand, for the last ten years, and in that time I have not had a grub-eaten potato where I put the phosphate. All my potatoes grow as smooth as a bottle, and of a large, salable size. I never use stable manure of any kind on potatoes now. I would not put it on if it was given to me,

and I had to pay fifty dollars per ton for phosphate. My neighbors have tried it with a like result. It is a very cheap fertilizer; on good ground I only use about two bags per acre (400 lbs.), which is a good manuring on ordinary soil. I have raised four hundred bushels to the acre with nothing but phosphate, applied in the row."

A Handy "Bug-Catcher."—Although it is now the custom of most of our farmers to rid their crops of that terrible pest, the potato bug, by Paris green poisoning, still we think the following illustrated sketch of a bug-catcher, sent by a gentleman who has used the contrivance with great success, will prove interesting and profitable to our readers. He says: "With the pan I use for catching Colorado beetles, any one can do as much work as three or four people collecting the pests, according to the ordinary method



CONTRIVANCE FOR CATCHING THE POTATO BEETLE.

of hand picking. The pan is made of tin, and any tinman can fashion it. It is a box or pan, two feet long, one foot wide, and six inches deep. The bottom should be round, or cylindrical, so that the rim of the pan can be got close to the ground when the vines are small. Stiffen the edge with wire. On the inside, at the top, solder a rim or flange about three-quarters of an inch wide. This should slant downward somewhat, as its object is to prevent the 'bugs' from crawling out when once they have gone in. On one side of the pan solder or rivet a handle, such as those on common tin milk-pails. On the same side as the handle solder a shield of tin eighteen inches high, and of the same length as the pan, slanting backward a little. The edges should be stiffened with wire. About four inches from the top of the shield, and in the center, solder a loop or ring large enough to admit the arm to the shoulder. In using, insert the left arm through the loop, and

grasp the lower handle with the hand, then, holding the pan close up to the vines and near the ground, with a crooked stick, like the one represented, gather the vines over the pan, giving them a smart shake against the shield and over the pan. A good, active man, with this contrivance, can 'bug' an acre of potatoes effectively in two hours."

The Potato Disease.—There are many devices suggested for avoiding the disease known as potato rot. There is one made by an English writer, who says it has been found that "by hilling the plants up very high as soon as the blight appears, the spores are prevented in a great measure from being washed down by the rains, and the rot consequently much diminished. It was found that although the spores were readily washed downward through one or two inches of earth, they very rarely reached a depth of five inches. The experiment was repeated many times with the uniform result that where the plants were not hilled up, and the tubers lay but one or two inches deep, the percentage of rot was very large. But where the tubers were covered to the depth of five inches, the damage from the disease was inconsiderable." If a physician were to say to a patient having the small-pox that if the lower part of the body were swathed in wet sheets the disease would not get down to the legs and feet, it would be a parallel suggestion to this. The rot is a disease which infects the whole plant. It has been found that when the disease began in the tops at a late stage of the growth, mowing off the diseased tops saved the tubers. This is something like amputating a gangrened limb to save the body, and is a reasonable remedy. But the spores are not always, and are in fact rarely, ripe at the season of growth, and are generally in the soil and infect the plant from the roots. The tubers are not roots, but stems, and receive the infection from the roots when the source of it is in the soil. When the leaves are infected by spores, carried in the air from distant fields, where they have remained during the resting season, the disease spreads through the tissues of the plant and reaches the tubers in that way, from within, and not from without. The spores are not free until the plant decays, being set free by the decomposition of the diseased tissues. This being distinctly known, it becomes of the greatest importance to destroy the infected vines by burning them, and thus preventing the soil from infection by the matured spores in the leaves and stems. Earthing up the potatoes might possibly have helped to preserve the tubers from the disease by removing the water from the saturated soil; this water being injurious to the plant and producing all the conditions favorable to the spread of the disease. A more healthful condition of the plants would tend to prevent this unhealthful condition and confine the disease to the leaves and stems, and save the tubers. But every one who has had diseased potatoes, knows that tubers, apparently sound when dug, will rot in the cellar. This is because the disease is already in them when they are dug, and develops in them in the course of time from the infection. Earthing up cannot save them then, nor can it at any other time, excepting through its influence in the way we have pointed out. But here, where our seasons are not so wet, it would not avail us as it might the farmers of sodden England or Scotland or Ireland, where "the rain it raineth every day," more or less. This difference of climate is very important to be remembered when considering such matters as this from an English view.

Methods of Raising Potatoes.—There is, writes a practical farmer, a great variety of opinion in regard to raising potatoes, size of seed, and culti-

vation. Some advocate large, while others prefer small potatoes for seed, thinking that they are as good or better than large ones. They may raise good crops from small seed for one or two years, but if they do not obtain their seed from those that do take pains to select large seed, I think they will soon find their potatoes run out and become small. Why do we select a nice, well-shaped ear of corn for seed, not always the largest, but the best developed? Also, why screen wheat, oats, etc., to secure the plumpest and best seed to plant or sow? (At least we should if we do not.) We thereby raise a better quality of grain, and more of it, from year to year. I do not wish any one to infer that we should take the largest potatoes for seed, but those of a good marketable size, of nice shape, free from warts, scabs or other deformity.

Having my seed selected, I cut them to single eyes, or at most two, and plant them in drills three feet apart, and fifteen inches apart in the drills, having the drills deep, in well-plowed and thoroughly pulverized soil. I prefer a piece that had corn on the previous year, well manured and plowed in for that crop, and kept under good cultivation during the season. On potatoes I use some good commercial fertilizer that has plenty of potash in it, and use it liberally—400 to 500 pounds per acre. This will help keep the wire-worms away, and will increase the potatoes in size and quality, I am quite certain. I harrow, as soon as I see the first plants breaking the ground, with a smoothing harrow, to kill all the weeds that may have started. I cultivate often, whether there are any weeds or not, until they are in blossom. I have never failed to raise a good crop of nice smooth potatoes, and there was always a ready market for them. I often get considerable more than market price for them, which is quite an advantage in a plentiful season. My crop averaged about 500 bushels per acre last season.

How to Keep Sweet Potatoes.—A Texas writer says: I would like to give my plan for keeping sweet potatoes. I think the most essential thing is to dig them at the proper time, and I think that time is about the full moon in October (that is, in Texas). No matter about the weather, unless the ground is too wet. I never wait for frost; but if frost comes before the full moon, dig as soon as possible, or at least before any rain. I dig with a bull-tongue plow; but any way, so they are not cut or bruised too much, will do. In gathering them, sort out the cut ones; but before putting up let them have at least one day's sun. If the ground is wet, two days is better; but in no case let them take the dew of the night. I put them in a shallow cellar under some house, say from three to four feet deep. After they are put away, throw a little fine, dry dirt over them, just enough to dust over the cuts. That will cause them to dry and not commence rotting. Let them lay that way till the weather begins to turn cool. Then begin to cover up as the weather gets colder, till they are from ten to twelve inches deep; in all cases cover with dry dirt. I differ with those who want straw or leaves under potatoes; I want them on the ground.

When they are banked outdoors they should be on an elevated place, or throw up the dirt so water will not stand about them. Put the potatoes on the naked ground, about twenty-five or thirty bushels in a bank; set up corn stalks around them; then throw some grass or leaves on the stalks; bank up enough of dirt against the stalks to hold them. Let them stand that way till the weather begins to get cool; then begin to cover. When the weather gets very cold they should be covered at least twelve inches; but in warm

weather they should have a little air at the top. In all cases have them well sheltered; a very small leak will ruin a bank of potatoes.

Points About Potatoes.—In the judgment of the South Deerfield (Mass.) Farmers' Club, potatoes, when properly cared for, are, next to tobacco, the best paying crop a farmer can raise. The trouble is, potatoes are too often neglected and receive attention only when other crops are cared for. Turf land is the best, except in very dry seasons. Plow in the fall and harrow in a good coat of manure in the spring. Furrow out, and in the hills apply ashes and tobacco stalks cut about six inches long, at the rate of sixteen loads per acre. Twelve hundred pounds of fish and potash to the acre, harrowed in, with a little phosphate in the hill, produced a good crop.

More attention should be given to selecting good seed potatoes. Use good-sized smooth tuber cut into four pieces. Change the seed every year or two. The Early Rose is the best kind for home use. Peerless, Beauty of Hebron, and Burbank Seedling give larger yields, but are inferior in quality. The Snowflake bakes well. Early Vermont resembles Early Rose, and is better in yield and quality.

Hoeing potatoes is best done with a horse-hoe or tobacco-ridger. Go through the piece three times with a horse-hoe, and you wouldn't need to put a hoe into it; that is, on smooth land free of stones. To get ahead of the bugs, cover the potato tops about an inch deep as soon as they are up; in about a week cut a lot of small potatoes into four or more pieces and wet them and sprinkle Paris green on them, stirring well until the pieces are covered with it; scatter these pieces over the field, and the beetle will eat them and die. If all do not partake of this wholesome diet and slugs appear, apply Paris green mixed with plaster. Potatoes are a paying crop at fifty or sixty cents a bushel, and the small ones are excellent to feed hogs, stock, and horses.

Getting Potatoes Early.—Some years ago, writes a correspondent of the *Gardener's Monthly*, I conceived the idea of planting my potatoes with shoots to them. Probably the sprouts suggested the idea; at any rate I carried out the plan, and have been so well pleased with it that I have followed it out for three years. A few weeks before planting time I select my seed potatoes, and set them in a warm place to sprout. By the time my ground is ready the shoots are about three inches in length. The potatoes are handled carefully, so as not to break the growth, and cut up in suitable sizes, as in the ordinary way. One strong shoot is left to each piece. The sets must be put into the ground carefully, of course, or the shoots will be broken off. As growth commences at once, the green tops show in a few days. There is easily a saving of two weeks time at the start. Those who have rather a low ground, which cannot be worked very early in spring, as I have, will find this method will enable them to compete with their neighbors on higher ground, with success. By July 10th, I was using fine Beauty of Hebrons (an excellent early sort by the way), planted April 25th. They were not then fully ripe, though the yellow tint in the leaves was getting quite perceptible. Generally the tops are dead at this date, but an unusually fine potato season kept them growing later this year.

Raising Potatoes.—The following suggestions are from a practical farmer: I select a piece of suitable ground in the fall. Sod is best. Manure it heavily with good barnyard manure, and plow under so as to let the

sod rot before cold weather; then in the spring I manure with well-rotted manure on the surface, and harrow thoroughly till the manure is completely incorporated with the soil; then I mark one way three feet apart and plant two pieces in a place about one foot apart, about four inches deep. Then, just as the potatoes begin to break ground, I harrow thoroughly, then cultivate till it is time to lay by; then I use a single-shovel plow to hill them with; keep all weeds down—they are death to potatoes. I have raised from 450 to 500 bushels to the acre in favorable seasons.

Now, as to the seed: I cut to a single eye; I would as soon think of planting a whole ear of corn in a hill as a whole potato. I have often, in case of a new kind, cut the eye cluster into three or four pieces, and had a good hill from each piece. As to time of planting, I always try to get my whole crop in for early potatoes. I believe the earlier they can be got in the more certainty of a good crop. As to kinds, I have raised legions of them, but for early, the Beauty of Hebron; for medium, the Burbank's Seedling and the Mammoth Pearl; and for late, the Belle and the Late Rose. Of course, others are good and may do better in other places.

New Remedy for Potato Bugs.—A farmer successfully tried a remedy for potato bugs, as follows: He procured a number of boards and placed them here and there among his potatoes, and on these boards were placed raw potatoes sliced. At noon on the first day of the experiment he and his hired men found every piece of potato covered with bugs. The men killed this crop, and at night another crop was killed, though not so large, and in a week not a bug could be seen, and his trouble with bugs after this was comparatively small. He thinks it would be a good plan to dip the pieces of potato in Paris green, as it would save the work of killing the bugs.

Potatoes in Winter.—Potatoes stored in cellars, in some cases, rot. To check or prevent this, keep the cellar as cool as possible without freezing. Then scatter quick-lime over them. This is of threefold benefit. It keeps them from rotting, makes the potatoes dryer and better, and disinfects the atmosphere, preserving the family from malarial fevers.

Experiments in Plowing.—Mr. Knox, a veteran plow-maker, has called our attention to the effect of deep plowing of some soils to offset the danger from lack of rains in dry seasons. Some years ago an experiment was made by a Western Massachusetts farmer in plowing portions of a large field at varying depths. One part was turned over seven inches deep, another ten inches, and a third, after being plowed ten inches, was subsoiled to the depth of ten inches more, making a soil comparatively loose to the depth of twenty inches. The next year, which was a dry one during the summer, corn was grown upon the whole field, which was treated uniformly throughout, and the yield of the three divisions carefully measured. The seven-inch plowing yielded as well as the ordinary fields in the vicinity. That part plowed ten inches deep was greener all through the season, and gave decidedly better yield, but that which was plowed ten inches, and subsoiled ten inches in addition, produced just one-third more corn than that plowed in the usual way, seven inches deep. The next year the whole field was by agreement sowed to oats, as a continuation of the experiment, the season proving even drier than the preceding one, when corn was grown. When the oats were about ready to cut, Mr. Knox, being in the neighborhood, called to see them. Before reaching the farm, the field came in view from the car windows, and Mr. Knox, who was on the lookout, said to

a companion, that the gentleman had not done as he agreed, for he could see that he had sown different kinds of grain upon the different plots, the size and color of the growth both marking the lines, dividing the land plowed at three different depths. But on arriving at the field he found nothing but oats, and as stated by the owner, all sown on the same day, and treated precisely alike in every respect.

On the shallow plowed section, the growth was short and the straw yellow; on the ten-inch plowing the oats were taller and less yellow, while on the sub-soiled portion they were green and very heavy. The final tests showed full one-third more grain on the sub-soiled part than on that which was plowed only seven inches deep.

Now, it will not do for farmers to calculate that deeply stirring every kind of soils would alone add fifty per cent. in the yield of crops grown upon them the following two years, for they would doubtless be disappointed in very many cases. Yet, as a rule, a deep, mellow soil from which surplus water can readily settle without making the land into mortar, and through which the same moisture can again freely rise by capillary attraction, other things being equal, will always bring a farmer the better results.

There are soils which naturally are never too wet, and rarely too dry, and it will usually be found on examination, that they are in the same mechanical condition for a considerable depth, say two feet or more, that one likes to have his surface soil, light, friable, and containing a due proportion of vegetable matter. They will also be found to contain sand and clay in about the right proportion to keep the soil both mellow and moist through the varying climatic conditions. Deep plowing of stiff clays is often dangerous at first; but a good dry soil suits all kinds of crops in all kinds of weather. Deep plowing tends to make such a soil, but this alone will not always be sufficient. Draining and manuring must accompany deep plowing.

Early or Late Fall Plowing.—There is this against early fall plowing, that it favors the springing up of grass and weeds, which necessitates re-plowing in the spring. The fall rains, should they be heavy, will pack the surface of clay soil, which the frost that follows does not always relieve, and never if pressed during the winter by a deep snow. This not only compels plowing in the spring, but the soil then turns up rough, and generally too wet and sticky, and also it is necessarily done late in the season, so that fall plowing, instead of benefiting, hurts it, and the crop for the season is lost or seriously affected—the land showing it for a year or two more. But as the season is now advanced, there is little danger from the rains; the land would rather be benefited by them. Late plowing, therefore, is in order. Land ordinarily the wettest can now be plowed to the greatest advantage. It requires more power to break it, but the improved condition in the spring will more than pay the expense. This is a point not sufficiently considered.

If late fall plowing is an advantage, better still if it can be done in winter or early in spring, so as to be followed by freezing and thawing. My best success has been obtained by winter and early spring plowing. Yet there is hardly a year in which one of the three seasons—either late in the fall, during the winter or early in the spring—is not available. To make as sure as possible, do the work in the fall, if the ground will admit, but avoid making mortar. The same applies to winter and early spring.

Other soils, especially the sand and leachy shales, have less to fear from water; they are also less benefited by the frost. They are the soils, therefore, that may be left unplowed till spring. One of the difficulties with

spring plowing is that it does not allow of the winter application of manure, should it be required, though with an early spring and favorable weather, this may be done without interfering much with the work which usually requires all the time. The aim should be always to get the plowing done near to winter (or in it) as possible, so as to get the benefit of the freezing and thawing, and avoid the packing of the heavy rains.

The Philosophy of Hoeing.—It may be overdone or underdone. There is reason in everything, "even in roasting eggs," as the saying is. So in hoeing crops. If we hoe up the soil in large lumps, as we are apt to do with the very serviceable modern prong-hoes, we let the keen, dry air into contact with the starting but enfeebled roots, and, by their parching, an irreparable injury is done. Such lumps should be crushed down so as to be permeable to air throughout, and yet serve to protect the roots from its free sweep. But, as in avoiding Scylla we may run to wreck on Charybdis, so, in crushing the soil, we may make it too fine, in which case the first heavy rain will run the surface together in a crust impervious to the air, and, for want of enough of air, essential to active root action, growth will be checked until the hoe or its equivalent is used.

Quantity of Seed to an Acre.—The following should be kept for reference: "Barley, broadcast, two to three bushels; bean, pole, in hills, ten to twelve quarts; beets, in drills, five to six pounds; broom corn, in hills, eight to ten quarts; buckwheat, one bushel; cabbage, in beds, to transplant, half pound; carrots, in drills, three to four pounds; Chinese sugar cane twelve quarts; clover, red, alone, fifteen to twenty pounds; clover, alsike, alone, eight to ten pounds; clover, lucerne or alfalfa, twenty pounds; corn, in hills, eight to ten quarts; corn for soiling, three bushels; cucumber, in hills, two pounds; flax, broadcast, one and one-half bushels; grass, Kentucky blue, three bushels; grass, orchard, three bushels; grass, English rye, two bushels; grass, red top, three bushels; grass, timothy, one-half bushel; grass, Hungarian, one bushel; grass, mixed lawn, four bushels; hemp, one and one-half bushels; mustard, broadcast, half bushel; melon, musk, in hills, two to three pounds; melon, water, in hills, four to five pounds; millet, common, broadcast, one bushel; oats, broadcast, two to three bushels; onion, in drills, five to six pounds; onion for sets, in drills, thirty pounds; onion, sets, in drills, six to twelve bushels; parsnips, in drills, four to six pounds; peas, in drills, one and one-half bushels; peas, broadcast, three bushels; potatoes (cut tubers), ten bushels; pumpkin, in hills, four to six pounds; radish, in drills, eight to ten pounds; rye, broadcast, one and one-half to two bushels; salsify, in drills, eight to ten pounds; spinach, in drills, twelve to fifteen pounds; sage, in drills, eight to ten pounds; squash, bush varieties, in hills, four to six pounds; squash, running varieties, hills, three to four pounds; tomatoes, to transplant, quarter pound; turnip, in drills, one pound; turnip, broadcast, half pound; vetches, broadcast, two to three bushels; and wheat broadcast, one and one-half to two bushels."

Soaking Seeds.—I am often asked, writes a New England agriculturist, whether it does any good to soak seeds before sowing them? In general I believe it does more harm than good, and if done at all, a good deal of judgment should be used to prevent mischief. Thus peas, beans and corn are often soaked to hasten germination with the belief that they will come a day or two earlier, but in case the weather is cold and wet for some time after sowing the seed, it will be more likely to suffer injury from the weather

than if sown dry. Especially is this true of the McLean pea and other delicate green peas, and of the various kinds of sweet corn. When the weather is dry and hot, however, it may be an advantage to steep the seeds before using them, and especially so in the case of seeds that are slow to germinate, such as celery and parsnips and carrots. To steep these seeds for a few days until germination has started and then dry them just enough to make them pass readily through the seed drill, will hasten their coming up, so that weeding will be less difficult in case the land is foul; but such seed should not be sown upon foul land if it can be avoided. Care is required in steeping seed that fermentation does not occur, which will frequently kill the seed. It may be arrested by turning off the water and spreading out the seed thinly upon a piece of sheeting and partially drying it. To steep seeds in chemical solutions with the belief that this will answer in place of fertilizing the land, I believe, is sheer humbug and imposition upon common sense. The only chemical stuffs that have proved useful, so far as I know, are the blue vitriol to destroy germs of smut, strychnine to destroy crows and blackbirds and a smearing of tar on corn seed for protection from these birds.

Raising Roots.—The average farmer is now devoting all his energies to the production of the greatest possible number of bushels of grain. Concentration of effort is generally commendable, but when applied to one particular branch of agriculture to the exclusion of others just as important, or to the detriment of the whole enterprise, it is not commendable. In other words, it is very bad management, and the evil effects of such a course will, sooner or later, become manifest in the exhausted condition of the soil, where this system of indiscriminate grain raising has been pursued.

The true policy of farming is to produce good crops and feed them out, so far as practicable, upon the farm. The larger the stock carried on the farm the greater will be the amount of fertilizing material produced.

In this case, good management would consist in growing those crops from which we could realize the greatest return per acre, thereby enabling us to carry more stock upon a given area.

Considered in this way, the root crop is an important factor in stock raising, as it yields largely to the acre, and is a most nutritious and wholesome diet, when stock is deprived of other green food during the feeding months. Aside from their nutritious qualities, roots possess a mechanical value of no less importance, as they materially aid in the assimilation of dry food, which too often forms the exclusive diet of stall-fed stock.

Of all roots, carrots are the most nutritious, and when the soil is deep, rich, and mellow, they will yield enormously, sometimes as high as ten or twelve tons to the acre. They keep well and can be fed all the year round if properly cared for. They are not so easily harvested as the beet and mangold, as the roots penetrate deeply into the soil, necessitating the use of the spade or plow when harvesting. Probably, for this reason, they are not so extensively raised as they should be.

The mangold seems to be the favorite at present, as, perhaps, all things considered, it should be. Under the most favorable circumstances it will yield even heavier than the carrot, and it also keeps well for spring feeding. Rutabagas and turnips come last in the order when considered as to their respective values. The greatest argument in their favor is, that they can be raised with the least labor and can be raised as a second crop, sown late in the season. This is particularly the case with the turnip, which may be sown as late as August 1st.

To raise roots profitably, we must, of course, do away as far as possible, with all hand labor. The garden or field should be long and narrow, with the drills running lengthwise, so that horse-power may be used to advantage when cultivating them. For sowing, the garden seeder, run by hand, is the best implement. When rightly managed this work need not interfere with other farm work. Many farmers have an idea that such crops must be in the ground the very first of the season, before the other field crops are sown; but such is not the case. Those calculated for feeding out to stock should not be started out before the first of June. By leaving them until this time, the seeds will germinate more surely and rapidly, and the weeds will not have three or four weeks the start of the plants, as is the case when sown early in the spring.

Let us have acres of roots this year instead of rods. I am confident that the farmer who sows and properly cares for an acre of roots this year, will want two acres or more next year.

Storing Roots.—A writer in the *Nebraska Farmer* says: "We always find turnips put in the cellar become pithy and worthless. My method is to obviate this, and I do it in this way: When I pull my turnips I cut off the top way down into the turnip, cut deep enough to cut all the eye out; then cut the root off smooth and nice, and you have them in a condition to place in a cool part of the cellar, or to bury out in open ground, and you need have no fear of pithy turnips. Beets should be buried out of doors, with manure over the dirt, so the ground will not freeze. In this way you can get at them any time in the winter. A part of the parsnip crop should be in the fall; they may be put in the cellar; no matter if they do wilt, they are so much the sweeter."

Cutting Clover Hay.—Clover hay is greatly improved by curing in the cock. The method is as follows: The clover cut in the forenoon is left to wilt in the swath until evening. Before the dew begins to fall it is raked into winrows, and is thus left until noon the next day. Then it is spread, and is exposed for an hour or two to the sun. It is then raked and heaped into cocks, about four feet wide and five feet high, and then left until the whole crop is ready to carry off the field, or at least twenty-four hours. In the cock it ferments, heats and sweats, but takes no injury, because the heated vapor passes off freely, as may be noticed by walking in the field at night. During this curing process, some of the woody fiber is changed to starch and sugar, and the quality of the hay thereby improved. Before the hay is hauled the cocks are thrown over, and the insides are aired for a short time, to evaporate any moisture. It is then drawn to the barn, and although it may heat again, it will suffer no injury. Generally it will not heat after the first fermentation, and will go into the barn green, sweet and without any loss of leaf by over-drying. Sometimes immature buds have bloomed in the mow when the clover has been thus cured, and the hay has preserved even the color of the fresh blossoms.

Making Hay—A Good Suggestion.—Farmers who have cut grass for hay should let it alone during the continuance of wet weather. There is no greater mistake than to break the swath, as grass never takes less harm and throws off more wet than just as it is left by the scythe or machine. Every blade of grass is provided by nature with a waterproof mantle in the shape of an impenetrable glassy covering of silica. This envelope is perfectly able to keep out the rain; but tedding and turning breaks it and opens joints into

which the wet enters. It is then that the mischief begins, the external wet mingling with the internal sap and causing fermentation. How long grass will resist the bad effects of rain we hardly venture to state, but we are confident that a week or ten days' bad weather will be best met by the passive system here indicated.

To Banish Crows From a Field.—Machinery of various kinds, such as wind-mills in miniature, horse rattles, etc., to be put in motion by the wind, are often employed to frighten crows; but with all these they soon become familiar, when they cease to be any use at all. The most effectual method of banishing them from a field, as far as experience goes, is to combine with one or the other of the scare-crows in vogue the frequent use of the musket. Nothing strikes such terror into these sagacious animals as the sight of a fowling-piece and the explosion of gunpowder, which they have known so often to be fatal to their race. Such is their dread of a fowling-piece that if one is placed on a dyke or other eminence, it will for a long time prevent them from alighting on the adjacent grounds. Many persons now, however, believe that crows, like most other birds, do more by destroying insects and worms, etc., than harm by eating grain.

About Tobacco Growing.—The ground for tobacco should be plowed in the fall or early in spring, six to eight inches deep, and just before planting plow it again, this time more shallow. Pulverize and level the surface soil, then mark out in checks or drills. If White Burley tobacco is to be grown make the rows three and a half feet one way by twenty inches the other. Always procure well matured, pure seed, and be sure that it is true to name. Some kinds are better adapted to certain soils than are others, and you may labor under a disadvantage if seeds are not true to name. When the plants appear above the ground, after being transplanted, begin using the hoe and continue until they are too large to work in.

Seed Corn.—In an address on the subject of corn, Professor Beal remarked that the top-most ear was the best for seed; of two fields, one planted with seed taken at random and the other selected in the field, the latter yielded as much again as the former. Manure and cultivation may be thrown away on poor seed. The best time to cultivate corn is before planting. A shallow cultivation was recommended. Twenty-three ears of corn can be produced from one kernel: by proper cultivation and the use of the best seed as high as twenty-five ears. Smut is a great damage to corn, and smutty corn is very injurious to cattle.

Weeds.—There is no surer or better way to perpetuate weeds, than to pull or mow them and cart to the barn yard or pig pen. The seeds will ripen perfectly, and when carted out to the field again with the manure, they will find plant food just where they would put it were they, instead of us, lords over creation. If one finds a weed that he is choice of, with its thousands of seeds just ripening, and fears that pulling and leaving it on the ground will cause the seeds to rot from dampness, it is well to deposit such weed on a rock or fence, where it will dry, and the seeds ripen in safety.

Improving Pasture Lands.—A few years since, says a writer, I had an old pasture that had almost run out, covered with weeds and patched with moss. I mixed a few barrels of salt and wood ashes, and applied about two barrels of the mixture per acre, covering about half of the lot. The result surprised me. Before fall the moss had nearly all disappeared, and

the weeds were rapidly following suit, while the grass came in thick, assuming a dark-green color, and made fine pasturage. The balance of the lot remained unproductive as before, but the following year it was salted with like results.

Blue Grass and Timothy.—A writer on blue grass says: "Prepare the ground late the previous autumn, so that it may have a mellow, fresh surface in the spring, and very early sow timothy, clover, and blue grass at the same time. About two crops of clover and timothy are obtained before the blue grass gets full possession. After that it chokes them out. The land is not pastured in less than two years from sowing."

Combining Different Varieties of Potatoes.—It is said that the qualities of two different varieties of potatoes may be combined in one new variety in the following manner: Cut an eye, with some of the flesh, from one kind and insert it in a corresponding cut in another with which you desire to mix. When the sprout starts it will feed for a time upon the potato and partake of its qualities.

Killing Canada Thistles.—The best way is to let them grow until they blossom, then cut them off near the top of the ground; the stalk will then be hollow; the water will get in the hollow and rot them, so they will never sprout again. If they are cut off with a hoe or plow, the ground will close over them, and there will come two sprouts for one.

Late Weeds.—In the old wheat fields, where the weeds have started up, turn in the sheep. They are not dainty in the choice of food, and weeds that are pushed forward by the late rains might as well be converted into mutton as to remain and make the field foul.

FERTILIZERS.

A Few Words About Lime.—Professor Puryear, who is recognized as a skillful chemist, gives in a recent paper the following succinct suggestions on the uses and misuses of lime:

What are the uses of lime in agriculture?

1. Lime is always one of the nine substances found in the ash of plants. The grasses and forest trees particularly take it up from the soil in great abundance. When lime is not present in the soil in sufficient abundance to meet this demand, it should be added.

2. Lime is needed to hasten the decomposition of vegetable matter, and so make it available as plant food. If we wrap up a piece of lime in a cloth, in a short time the cloth is so decomposed that it will fall into shreds from its own weight. Tanners use lime in their vats to rot the hair from the hides. Now, lime behaves exactly in this way in the soil. The vegetable matter in the soil is useless until it decomposes, and lime hastens the process of decomposition.

3. Lime is frequently necessary to correct acidity in the soil. Soils charged with vegetable acids are never productive. On such soils we put lime, which, combining with these acids, forms neutral salts of lime. A person takes a little lime-water for the same reason when he suffers from acidity of the stomach. When lands have been freshly drained, they are always acid. The excess of water, with which the land was saturated, had excluded the atmosphere, and so had prevented the complete decomposition of vegetable matter. This vegetable matter, if the air had not been excluded, would have been converted by atmospheric oxygen into carbonic acid, ammonia, etc., but, without oxygen, its elements rearrange themselves, and form those injurious compounds, ulmic, humic, and geic acids. When the soil is drained, the atmosphere strikes through and destroys these acids, but not entirely in a single season. The process, of necessity, is slow. The soil to the depth of several feet, it may be, is sour, and it will be some time before the atmosphere can thoroughly permeate this soil and burn out these hurtful acids. Lime, then, comes to help the slow operation of natural causes. When it is spread upon the soil, it is carried downward by the rains, and combines with and neutralizes speedily and effectually the vegetable acids. We cannot possibly err, then, when we put lime on freshly-drained lands. In such lands there are not only free acids, but a large amount of organic matter, which has not been decomposed because of the exclusion of atmospheric oxygen. The application of lime to such soils corrects this acidity, and, by decomposing, renders immediately available this large amount of vegetable matter.

The ash of the grasses contains twenty-two per cent. of lime. Hence the practice of top-dressing the grasses with gypsum, which is the sulphate of lime.

Lime may be injuriously applied. If the soil contain but little vegetable matter, the application of lime, particularly heavy applications, will cause

this vegetable matter to decompose too quickly. When the crop approaches maturity it finds that its quantum of vegetable matter has already been decomposed and used up. The result will be conspicuously disastrous if the soil was not deficient in lime. The lime has supplied no want, but has only inflicted an injury,

1. Lime is known as caustic or quick lime. This is the article as we obtain it from the kiln. Heat has expelled carbonic acid from the carbonate of lime, and caustic lime is the result.

2. Hydrated or slaked lime. When we add to lumps of caustic lime about twenty-five per cent. of water, the lumps fall down into a perfectly *dry* powder, giving us slaked lime.

3. Upon exposure to the atmosphere, this slaked lime loses its properties. It becomes the carbonate of lime, or mild lime—the very compound chemically from which the lime was originally obtained. This mild lime, or carbonate of lime, has no caustic or disorganizing properties whatsoever. It may be asked, then, why we do not use lime in its natural state, namely the carbonate of lime, if it gets into that condition when we spread it on the soil? We answer:

1. Although lime goes back to carbonate of lime, it does not do so all at once, and, in the process of returning to that condition, it decomposes vegetable matter, and so makes it plant food.

2. The natural limestone rock—the carbonate—is very hard, and its reduction to a powder by mechanical means would be difficult and expensive. Now, when lime slakes in the air, it falls down into a dry powder. No mechanical reduction, therefore, is necessary. It requires less expenditure of force to burn the limestone, and let the lime fall to powder of itself, than to reduce the natural rock by mechanical power.

Trees, like grasses, contain lime largely. The indication is to apply old mortar, or lime in any form, to fruit or shade trees, and this should be done in the fall.

Home-Made Fertilizers for the "Common Farmer."—The following is from the *Ohio Farmer:* Let us look at an *average* barnyard—one that may be met with most anywhere. Here we see a large pile of horse manure steaming away as though on fire. Here a pile of cow manure all frozen so it cannot rot its own litter before summer. There a pile of dry corn-stalks, as they have been thrown out of the feeding-room. In one part of the yard stands a straw stack that the cattle run around and pull down, but the scatterings are left close around the stack, and are tramped two feet deep, while a few feet from the stack the ground may be seen. The corner of the yard where the out-door feeding is done is the only portion that is in any order for manure.

Now I will leave it to my readers if I have not described an average barnyard. This is where farmers are to blame. It is but little trouble to keep our barnyards in proper shape if we only will. Let us ask the proprietor of our sample barnyard if he has so much work during winter that he cannot attend to his yard. His answer will be: "No, but I thought the barnyard could take care of itself." With most of farmers there is a great deal of spare time during the winter. Their work, aside from stock feeding, is not very pushing, and a day's time now and then would not be missed. Let us have that day once in a while to straighten up that yard, and I will see to it that you are paid for it next fall. Let us take a fork every few days and go around that straw stack, taking the loose straw that is under foot and cover

up that bare spot of ground. Throw it wherever the manure is thin, and the cattle will tramp it more, making better manure of the straw, while it helps the quality of what is already there. Take a horse and sled every week or so, and move that pile of horse manure and that pile of corn-stalks. Put them around in thin spots in your yard, like you did that straw, and then see what a difference it makes in your yard. Above that cow manure pile just have a few stock hogs where they can get at it, and I dare say it will be taken care of. Two or three hogs are the best aids you can find to assist about the yards, but in justice to the hogs I will say that it is not the best thing for them. But every farmer has a few stock hogs that he is carrying over winter, and I am sure he cannot keep them cheaper than in his barnyard, where they get most of their living out of the cattle droppings and what is left after feeding. If your cattle are fed on corn in the stable, the hogs will thoroughly scatter the manure pile to secure the corn.

But now let us look a little to the bedding of our cows and horses. You read of A.'s or B.'s plan of securing liquid manure by troughs and pits, but you say you cannot do that way. I will tell you what you *can* do. Go to that straw stack and take largely of straw to bed your stock with. Don't be afraid of it, but make their bedding deep, especially behind them, where it will catch all the droppings. Then in cleaning your stables don't sort the straw too close, but throw out all that is dirty and fill up again with clean straw. The result will be that you are saving nearly all the liquid manure as well as brother A. or B. does it, and you have not had any of the trouble you were so afraid of. Moreover, your cows have had the benefit of a nice bed to sleep on, and they come out of the stable looking clean, instead of reminding you of a walking manure pile, as we often see cattle that are poorly bedded. There are some who have not got this extra amount of straw to lavish on their stock. To all such I say, go to your nearest saw-mill and get sawdust, and use freely for bedding, as this is as nearly as good an absorbent as straw, and makes good bedding.

Now, my brother farmers, such of you as *will not* give heed to the subject of foreign fertilizers and articles pertaining thereto, just try my plan for your own home-made fertilizers, and see how much you can increase them, and just that much will you increase your profits of the farm. Let us keep our eyes open through the winter, and at every opportunity turn a hand toward the barnyard, and manage carefully until we turn our stock out in the spring, and then we will counsel together again as to how we will handle what we have already saved, so as to improve the quality, and reduce the quantity, thus lessening the expense of removing to the field.

Something in Regard to Fertilizers.—Different soils and different crops require very much different treatment and different elements of plant food. A judicious cultivation of the soil adds to its producing capacity. The elements of plant growth contained in soils are unlocked and made available to some extent by proper working of the soil. It was formerly believed that it was necessary to add all the constituents of plant growth to the soil before plants could be produced. That if we wished to raise wheat we must add the constituents of wheat. If we wished to raise potatoes add the constituents of potatoes. This is not now considered absolutely necessary. If we use a fertilizer rich in nitrogen, phosphoric acid, and potash, with judicious rotation of crops, we may not only raise good crops indefinitely, but bring the land up to a higher state of productiveness every year.

On some soils we could safely leave out the potash, enough being yielded

annually by decomposing particles of soil—unlocking the sand grains, as it were, to get their treasures. On some soils nitrogen perhaps would not be called for at first, and on others, rarer still, phosphoric acid might for a time be found sufficient in the soil.

Cereal crops are especially benefited by nitrogen and nitrogenous manures. Usually from forty to eighty pounds per acre are required for full crops or largest crops. Clover is the best medium to use in charging soils with nitrogen. It is a nitrogen trap that is easily set and sure to catch. Clover may be specially fertilized with plaster. Potash is of little value in cereal growing, and phosphoric acid not greatly called for. In connection with nitrogen, phosphoric acid and potash are both useful in small quantities.

For Indian corn phosphoric acid is perhaps the best special fertilizing element. Land plaster often does good service. On some soils potash also proves valuable.

Grass requires all the elements of plant food. Well-rotted manure is perhaps the best special manure for it. Bone-dust comes next. Either of these can be used at seeding, or afterward as top dressing. Clover requires nitrogen and phosphoric acid in small quantities. Potash and lime are its most valuable manures. Turnips require nitrogen and phosphoric acid, the latter in soluble form. Superphosphates are specials for the turnip crop. Mangels want more nitrogen and less phosphoric acid than turnips. Potatoes are similar to turnips in their likes, and on most soils they need a supply of potash furnished. There is usually potash enough in our common barnyard manure for potatoes.

One hundred pounds of good bone, thirty-five pounds sulphuric acid, and thirteen pounds of water, mixed in a wooden vat or tub, will make one hundred and forty-eight pounds superphosphate dry. In mixing, however, much more water will be found necessary to possibly properly mix the mass, and when properly mixed, if after standing a day or two it is too damp, may be dried by adding ground plaster, or other material. The bone-dust should be wet with the water first, then the acid added, a little at a time; by so doing the vessel in which the mixture is made is less acted upon, and the incorporation with and action upon the bone is better. Stir with a wooden hoe or mixer. Never attempt to reduce whole bones with the sulphuric acid.

The advantage of reducing bones or rock phosphate with sulphuric acid is to render the solubility in water the greater when applied to the soils. Liming soils really adds no plant food to the soil, but has a tendency to develop it in the soil by the caustic, dissolving, breaking-down effect that the action of the lime has upon the particles of the soil, unlocking them, making them give up their hidden stores of plant food. It not only acts upon the mineral constituents in the soil, but upon the vegetable constituent parts.

Variation in Manures.—The subject of manures is of the highest importance in practical farming, for it is the basis of every effort at improvement. It is much better understood than formerly, thanks to the effort of agricultural scientists, combined with the experiments of practical workers. There are, however, some points which, though fully established, are too often overlooked. One of the most important of these is that bulk counts for little in fertilization as compared with quality. The introduction of guano and similar concentrated fertilizers, as superphosphate, nitrates of

potash or soda, has had a wonderfully educating influence in this respect. Farmers have marveled to see the large results from application of a few hundred pounds per acre of these fertilizers, and in some quarters these results have led to an undervaluation of the home-made manures. The fact that the concentrated fertilizer, being deposited generally with the seed, is more immediately available, does not demonstrate its superiority except for the single crop to which it is applied. The farmer who owns the land he tills, as most American farmers do, is interested not only in immediate profits, but in maintaining, if not increasing, the fertility of his soil. It behooves such a farmer to make himself thoroughly posted as to the comparative value of stable and barnyard manures made from different feeds and by different animals.

There is a much greater variation in the value of stable manure than is usually supposed, and this not depending on the amount or quality of the litter used as an absorbent, but rather on the excrement itself. A well-fed horse standing idle in the stable passes more of the manurial value of what he eats in his excreta than the same horse fed on the same material and hard at work. The nitrogenous and phosphatic materials that are of greatest value for all crops are precisely those which are retained in the working animal to repair the waste of sinew and bone from labor. There is an equal and invariable difference in manure, depending on the kind and value of the food used. It does not follow that food of highly fattening qualities will make rich manure. Few materials are more fattening than sugar, but as sugar is only carbon, though it will lay on fat rapidly, it adds little of value to the manure pile. Oil-meal makes a valuable fertilizer, for while the oil in the meal is fattening, it is also rich in phosphates. English farmers have grown rich, or, what is the same thing, made their farms rich, by feeding oil-cake to fattening animals. The oil, of little value manurially, went into the fat cattle and sheep, while the principal part of the most valuable fertilizing material was returned to their farms. We have other feeds costing much less than oil-meal, which for the resulting manure are nearly or quite as valuable. Among the least understood of these feeds is wheat-bran and coarse middlings. These are rich in the phosphates, comparatively poor in fattening qualities, but of more value for working animals than is generally supposed. It has been found by experiment that a mixture of wheat-bran with corn-meal makes a much better feed for work-horses than corn alone. It is not only in diluting the corn, which by itself is of too heating a nature, that such a seed is valuable, but the bran is absolutely richer in nitrogen and greatly richer in phosphates than the corn-meal.

The time will undoubtedly come when progressive farmers in the older sections of the country will feed for the purpose of making the most valuable manures with as much carefulness as they now feed for growth, milk, wool, or fat. In large sections of the country most of the profit of feeding must be found in the manure pile. As this fact becomes better recognized, the manurial value of certain feeds and the difference in the resultant manures will receive that attention which its importance in the farm economy deserves

How to Enrich the Soil.—The *Farm and Fireside* says: The production of paying crops on old, upland clay soils depends largely upon restoring to it, in the most economical way, the plant-food most needed by the crop to be grown. If corn is to be grown, manures containing a liberal amount of phosphoric acid and potash will be required. As these substances are valuable, constant cropping with corn will soon greatly diminish the value of the

land. If wheat is to be grown care must be taken to supply the necessary amount of phosphates. Wheat, oats, barley, and rye each require a large per cent. of ammonia, which accounts in part for the excellent results that follow the use of ammoniated superphosphates. If a crop of seven hundred and fifty pounds of seed cotton is grown upon an acre of land, about six and one-third pounds of phosphoric acid and seven and a half of potash will be taken from the soil. In growing tobacco the soil is quickly exhausted of potash; for this reason excellent results follow the planting of this crop on newly cleared lands. Manures of all kinds should be carefully saved and applied to suit the needs of the crop to be grown. Cabbage grows luxuriantly when supplied with green manure. The bean plant, on the contrary, requires that which is thoroughly rotted. Nitrogenous manures greatly increase the yield of wheat and other grains, and when used with phosphates on soils of average fertility, give a visible increase of root crops also. Another important factor in enriching the soil is a judicious rotation of crops, to be determined to some extent by the soil, climate, and the leading crops to be grown. In the North clover is indispensable, but in the South the cornfield pea answers an excellent purpose, especially for green manuring. In this section, where the soil is clay, and wheat and corn are the leading crops, red clover is indispensable. Soil exhaustion may be measurably prevented by even the simplest of all rotations, that of wheat, followed by clover, and this by corn. Such a rotation may be begun by sowing red clover in March upon the fields now seeded with wheat. Sow three pecks of red clover and one peck of mammoth clover, and one peck of timothy seed upon each six acres. The clover should not be pastured for the first year, except for a sufficient time for the hogs to pick up the scattered grain after harvest. After the 1st of June of the second year the clover can be pastured, but a sufficient quantity of that in which the most timothy grows should be reserved to cut for hay. This system provides for the accumulation of manure in a level yard with raised sides, so that the liquids will keep the entire crop of wheat straw and refuse cornstalks and other matter in a moist condition, and the decomposition of these materials is much hastened. After the haying and harvesting season is over, twenty-two horse loads of manure are applied to the acre on the clover field; that is to be plowed to a depth of eight to ten inches very early the following spring, where the corn corp is to be planted. Each load is divided into eight piles, placed five and one-half yards apart. Before seeding to wheat the corn is cut and shocked, and a heavy, sharp-toothed harrow precedes the drill. The high-cut stalks, when harrowed down, act as a mulch for the wheat plants during the winter, and measurably prevent washing even upon high ridges. A great advantage in this method of rotation is that the labor required to bring up the land in April is not half as great as in midsummer, and the corn, by being planted fully a week earlier than it can be on similar soils where there is no sod, yields abundantly and matures early, so that there is no delay in seeding with wheat early in the fall. As may be inferred from what has already been said, the prime factors for cheaply enriching the soil and increasing its fertility annually, are the liberal application of properly-cared-for barnyard manure, and a systematic rotation of crops, of which red clover is the basis.

Composting Manure.—Mixing manure or fertilizers is laborious work, and if nothing is gained by it, it is labor lost. But something may be gained by it when the condition of the material can be changed for the better, and at the same time something may be lost when anything can be changed for

the worse. In composting, for instance, such raw substances as swamp muck, leaves, tannery wastes, with manure, or in mixing various manures, as from the horse stable, cow sheds, pig pens, and poultry house, valuable results may be obtained; while in mixing lime or wood ashes with manure, and especially in mixing the common fertilizer with poultry manure and wood ashes, harm may be done and valuable fertilizing matter may be wasted. In the one case the more actively fermenting horse or pig manure will serve to decompose more readily the colder cow manure, and to produce decomposition in the abundant litter or raw matter that may have been used. Besides, when the whole manure heap has been reduced to an even and homogeneous condition and quality, it is made more valuable for use in the field, and neither unduly or wastefully enriches one portion of it while inadequately fertilizing another portion. It is, therefore, a judicious and useful practice to mix these manures or these substances in the heap, either in the yard or the field, and so add considerably to the value of a part without detracting from the value other portions. But in the other case much harm may be done by mixing any substances in the heap which may exert an injurious action upon the others. This may happen when lime or wood ashes are mixed with the manure or with the poultry manure; and the more harm is done, the richer in ammonia the manure may be. Lime and potash are alkalies, and when fresh are in a caustic condition. That is, they are free from carbonic acid, which, when combined with an alkali, renders it neutral, or mild and inert. When fresh lime or wood ashes are mixed with manure they at once seek to combine with carbonic acid, from whatever source they can procure it. Ammonia is an alkali, and in manure is generally in combination with carbonic acid as carbonate of ammonia. The lime or wood ashes take the carbonic acid from the carbonate of ammonia, and the ammonia escapes as gas into the air, and so far as the owner of the manure is concerned this ammonia is lost, and as ammonia is the most valuable and costly fertilizing element in existence, the loss is very serious. It is easy, however, to avoid this loss by using the lime or the ashes by themselves on the soil, and not with the manure directly, in which way they will do as much good.

But sometimes it is advisable to mix lime or wood ashes in a compost heap, and this may be done safely when the special behavior of these three indispensable substances are understood. If the manure is quite fresh there is very little ammonia in it, and if there is more, a large proportion of absorbent matter, as swamp muck in the heap will absorb and hold it, and carbonic acid will be produced by its decomposition in sufficient quantity to saturate the alkali of the lime or ashes or to take up the ammonia as fast as it is formed or set free. In fact, a farmer who understands the chemical decompositions and combinations which go on in a heap of decaying manure or compost may use lime and wood ashes with safety and with advantage. With regard to the common mixture of ashes, hen manure, and plaster, too, this may be safely and beneficially made at the time it is to be used, but not if it is to remain mixed for any considerable time previously.

Salt as a Manure.—Since soda, if essential in plant growth, is only required in small amounts, and chlorine, though essential for most plants, is still required in only small amounts, and common salt is found in minute quantity in most soda, chemists have asked why salt should be of any benefit as a manure, and from theoretical grounds have been disposed to deny that salt has any value as a manure. Yet practical farmers, not having the fear

of science before their eyes, have pointed to the increased crops, and asked, "How is that?"

There can be no conflict between practice and science, because science is the classified explanation of practice. I have said enough to show that it is not enough to cause the rejection of a substance as manure to say that it is not "essential" to plant growth.

Let us see what explanation can be made of the use of salt in agriculture beyond the small amount required for the ash element.

Professor May showed that solution of salt would render soluble the ammonia which had entered into insoluble condition in the soil.

Professor Atwater, in a recent report says: "Something has been said about the use of ordinary salt as a fertilizer. One important office of the salt is to make soluble, and consequently useful in the plant, the materials already locked up, as it were, in the soil. Supposing you have been putting on barnyard manure and other fertilizers. Some of the nutritive materials, as, for instance, potash and phosphoric acid, may perhaps have been taken up by the soil, and remain there in a difficult soluble condition. Furthermore, there are in the soil some of these ingredients that were in the original rock of which the soil is made up, and are still, so to say, locked up, or, in other words, still remain in an insoluble form therein. One effect of salt, as is the case oftentimes with gypsum and lime, is to set loose that potash as phosphoric acid. You must expect, therefore, in putting on salt, that its chief use will be, not as a direct nutriment to the plant, but rather as a means of setting other materials loose; and salt is very useful on this account, because it is not readily observed in the upper layers of the soil, but often leaches through into the layers; and it will have the effect of setting these materials free all the way down.

"The German farmers say, however, that you must be careful in the use of salt. If you put on too much it injures the vegetation. Further, it will not do to put on loose soil. A very loose, sandy soil is not ordinarily benefited by the application of salt. Again, it is best applied to soils which contain considerable humus. And, finally, it should be used on soils which are in pretty fair condition as regards the contest of fertilizing elements. On soils which are not too loose, which have a good amount of humus, and which are in pretty fair condition as regards the amount of fertilizing material, organic and inorganic, contained in them, it is oftentimes a good thing to apply salt."

Refuse Salt as a Fertilizer.—A Wisconsin farmer writes: I have used salt as a fertilizer for the last three years with good success, and I also find that where I have sown 200 pounds per acre the previous year my crops are much better than where I sowed salt in the spring of the same year. We have better crops in this county than in any other county in the State of Wisconsin, and produced by the use of salt. Farmers who at first could not believe that salt is good for anything are the most firm believers in it to-day. Those who sowed salt last year will sow double, and those who did not sow are going to sow next spring.

I sow the refuse salt from the packing houses. I have just finished drawing 22,000 pounds home to sow on my own farm. I shall try it on my winter wheat this week at the rate of 300 pounds to the acre. I have spread 2 1-2 tons on an acre, but plowed and worked it up with the soil for a turnip crop or for barley. It cost only 50 cents per ton, which made it a cheap fertilizer. It is used very liberally in England, where I came from. Many

people have a wrong impression about salt. They think when they salt cattle and sheep that salt kills the grass, but this is not so. The stock kills it by eating the ground where the salt was put down. I will admit that salt will kill most plants, and would like to find some one who would pay for enough for me to try the experiment.

I hold that in the West land needs salt as much as cattle do. The first time I tried it was on a twenty-acre lot sowed with spring wheat. In two weeks I could see the difference between what I sowed with salt and that which had received no salt, and I could also see the difference when harvested. The part sowed with salt had no chinch bugs, while on the other, which had no salt, I could gather up a quart to every sheaf the reaper threw off. I have never seen any damage done by chinch bugs where there had been two hundred pounds of salt sowed broadcast on the crop. The time for sowing is when the grain is about four inches high. I have sowed salt when the grain was coming out in head, and with good results, but would prefer to sow it earlier.

I prefer packing salt because it contains more or less grease and fat, besides blood from the meat, which is the essence of manure. Let farmers try the experiment, if only on a small piece, and not wait for some one else. Wheat yielded from twenty to thirty-five bushels per acre where salt was sowed, and where it was not sowed the wheat was not worth the cutting. Most of those who did cut it got nothing but No. 4 wheat, weighing fifty-one and fifty-two pounds to the bushel.

Formulas for Commercial Fertilizers.—A writer in the *Fruit Recorder* says: To produce a crop of wheat over what the natural yield would be without manure, I use about two hundred pounds sulphate of ammonia, one hundred pounds ground bones, forty pounds oil of vitriol, fifty pounds of muriate of potash, forty pounds sulphate of soda, one hundred and seventy pounds land plaster.

For Indian corn, to produce about thirty bushels shelled per acre, over natural yield: one hundred pounds of ground bones, forty pounds oil of vitriol, one hundred and fifty pounds sulphate of ammonia, one hundred and twenty-five pounds muriate of potash, high grade or eighty per cent., thirty-five pounds sulphate of soda, one hundred and twenty pounds land plaster.

For oats, to produce about thirty bushels over natural yield; One hundred and fifty pounds sulphate of ammonia, fifty pounds ground bones, twenty pounds oil of vitriol, fifty pounds muriate of potash (high grade), thirty pounds sulphate of soda, one hundred pounds land plaster.

For cabbage, to produce fourteen or fifteen tons over natural yield: Three hundred and fifty pounds muriate of potash (high grade), four hundred pounds sulphate of ammonia, two hundred and fifty pounds ground bones, one hundred pounds oil of vitriol, fifty pounds sulphate of soda, two hundred pounds of land plaster.

For potatoes, to produce over two hundred bushels over natural yield: Five hundred and fifty pounds sulphate of potash, two hundred pounds sulphate of ammonia, one hundred pounds ground bones, forty pounds oil of vitriol, one hundred and twenty pounds land plaster, forty pounds sulphate of soda.

For onions, to produce about four hundred bushels over natural yield: Two hundred and twenty pounds sulphate of ammonia, one hundred and fifty pounds ground bones, sixty pounds oil of vitriol, two hundred and fifty pounds sulphate of potash, one hundred and twenty pounds land plaster.

For rutabagas, to produce ten to eleven tons over the natural yield: One hundred pounds ground bones, forty pounds oil of vitriol, two hundred and seventy-five pounds sulphate of ammonia, six hundred pounds sulphate of potash, one hundred and fifty pounds land plaster, thirty-five pounds sulphate of soda.

The above formulas are given in quantities for one acre of each kind of crops.

It requires one hundred pounds oil of vitriol to dissolve forty pounds ground bones. Put the ground bones into a water-tight plank box and soak the bone with water for two or three days, turning on about twenty-five pounds of water to each one hundred pounds of bone; then turn on your oil of vitriol and stir it thoroughly with a wooden stick, two or three times a day for five or six days, then mix in the sulphate of ammonia, next the muriate of potash and sulphate of soda, and lastly the land plaster; thoroughly mix the whole mass together. To dry it off and make it fit to handle, incorporate dry muck, fine charcoal or sawdust, but do not use lime or wood ashes as a dryer. Sometimes farmers can collect bones on their own or neighboring farms, or get them very cheap from a butcher, in this case they want to mash them up fine with a sledge, and about sixty pounds oil of vitriol used to one hundred pounds of coarse bones.

Fertilizers vs. Plant Food.—The *Farmer's Magazine and Patron's Guide* says: Experiments are becoming continually reported by farmers that are misunderstood, and lead to conclusions, on the part of the experimenters at least, that are detrimental to agricultural progress. Take an example now before us, that of a farmer who used lime, superphosphate, guano, salt, a chemical fertilizer, and no manure, on as many plots of wheat. The yield in each case was good, varying from twelve bushels on the unmanured to twenty-six to thirty-five bushels for the manured plots. The lime gave the greatest apparent *profit* per acre, though the yield was not so large as where guano, chemical and superphosphates were used. Reasoning from the figures alone, this experimenter thinks he has a guide for future practice in wheat farming, and accordingly has now put seventy acres in winter wheat manured only with lime.

We shall be interested to learn the result of several years of this practice, but predict that it will prove an unprofitable venture. The soil on which this experiment was tried is naturally fertile clay wheat soil. Lime on such land always has a good effect for one or two applications—not as plant food, however, but in acting upon the soil chemically to make available that fertility which is contained in the soil, but in an unavailable condition. Lime *adds* no element to the soil, but forces it to yield up its stores of fertility. It should not be understood from this that lime is not plant food, for it is; but the great majority of soils, if not all, contain so much of it already that there is no necessity for supplying more. This lime, however, is in such a form that it does not have the effect upon the soil of newly applied freshly slaked lime.

It is a wise economy to utilize whatever of fertility the soil contains, but it must be done judiciously and not wastefully. So soon as it is found that the application of lime no longer produces adequate crops, the true reason should be assigned to the result, and that reason is that the supply of plant food is being exhausted, and outside sources must be called upon to make up the deficiency.

It is legitimate and proper to draw upon our bank account, but

we must also deposit, or there will soon be nothing in the bank to draw from.

Making Our Own Fertilizers.—A Virginia farmer writes: Having studied the subject of fertilizing our lands when it is impossible to manure with stable manure, and watched the effects on different kinds of land, I have come to the conclusion that when commercial fertilizers are honestly made it pays, even at the low price of grain, to buy and use them on grain lands, especially when being seeded down to grass, and when the land is too thin to make a set of grass a certainty. My experience has been that the money will be returned out of the gain. The set of grass will be always improved; the benefit will be felt while the land is in grass, and there will be a much heavier sod to turn under when the land is broken up. Now if it pays to purchase these fertilizers at from $25 to $90 per ton, besides paying freight on them and hauling them from the depot, how much better it would be for us if we could manufacture our fertilizers at home at one-fourth the cost! I once heard a gentleman, who had had years of experience in this line, say that pure Peruvian guano, even at $90 to $100 per ton, is the cheapest of all fertilizers. Now, unless I am mistaken, Peruvian guano is simply rotted bird manure, and must have lost some of its strength by being exposed to the air and sun. I suppose the birds that made this guano fed on bugs, fish, wild seeds, etc. We thus have one ingredient at least equal to the best fertilizer known, right on our farms, and one that can be vastly increased with very small additional expense. It is certainly of vast importance to the farmer to see that the flock of fowls is kept up, and see that not one ounce of manure is wasted.

Another thing is the hog manure. This is certainly a splendid fertilizer, and should be saved with the utmost care. I have known farmers to build their hog pens on a hillside leading to a branch to let the hogs get water, and thereby lose nearly all their manure. It may not be equal to Peruvian guano, but it is certainly half as good. Another valuable fertilizer is wasted on nine-tenths of all the farms in the country. This is the night soil, and everything that comes from the house—the liquid manures are as strong as the solids. My plan is to save all these things; pulverizing and making them into a real genuine fertilizer that can be drilled, handled, or used as are commercial fertilizers. Sink in your yard a vat that will hold two hundred bushels. (If one is not enough, you can sink another.) It should be well made out of two-inch oak planks, and have a lid with a good handle, so the wash-woman can lift the lid and pour her soap suds into it as easy as pouring it elsewhere, and where the chamber-maid should be required always to put into it everything in her line. Now add all the hen manure you can get; all the night soil, and a load or two of the best hog manure. Then add muck, loam or plaster enough to absorb all gases and stop all smell, so as to make it perfectly inoffensive. When the box is nearly full, add (if there is not enough already) enough liquid to make the mass mix easily, and with a long pole thoroughly mix, and keep stirring for several days, so as to reduce all lumps. You can then remove all sticks, cobs, etc., that may have found their way into it, with a coarse sieve fastened on a long pole. When thoroughly mixed and sifted, allow it to dry out, and if not dry enough when you want to use, spread it on boards and dry thoroughly. This fertilizer can be made at a small cost per ton, and will be found to do good work.

Home-Made vs. Commercial Manures.—A correspondent of the *New England Homestead* writes: The great body of common farmers will never profitably develop their agricultural resources or to any great extent increase the fertility of their farms until they keep or fatten more cattle and sheep. And the way to keep more stock is, to keep it without more ado—just as our wise financier remarked that the way to resume specie payments was to resume.

Notwithstanding the legislation for the protection of the honest manufacturer as well as the purchaser, the common farmer feels that in buying many varieties of commercial manures he is not master of the situation. This is why I advise farmers to keep stock or make their fertilizers upon their own farms as much as possible—to buy animal food rather than plant food. For horned cattle as a rule, buy firm cotton-seed meal, corn meal, fodder corn or corn fodder and swale hay. In purchasing food for other kinds of stock, we must be guided by their varied conditions, always feeding such kinds and quantities as will be kindly relished and thoroughly digested.

For several years I have bought twenty-five cords of stable manure annually. A large proportion comes from Boston and costs me eight dollars per cord delivered on my farm. Yet I consider it as cheap as any fertilizer in the market. In a cord of good manure free from foreign substances, we get the results of about two tons of hay together with the grain fed, less the animal waste or growth. If judiciously applied, the ground that receives the manure will in a number of years yield its full equivalent with interest. If plant food is to be bought, buy first good stable manure, fine ground bone, good hard wood ashes, and muriate of potash. When the honest manufacturer will sell these elements compounded as cheaply as the farmer can purchase and compound them himself, it may do to buy still more largely of commercial or chemical fertilizers. And in their application we must no longer work blindly.

Use of Plaster and Ashes.—Henry Ives, one of the best farmers in far-famed Western New York, writes thus sensibly to the *Tribune:* "To use plaster on any of our growing crops requires so slight a cast and so often proves beneficial, that one can hardly afford to neglect its application, although occasionally no perceptible advantage is derived from it, and, at best, we scarcely look for benefit except for the one season and the one crop. But in using ashes we are more sure of benefit, and its good effects are so lasting that after one liberal application, say of from 50 to 100 bushels per acre (though if leached ashes are used one could safely apply three to six times this quantity), the effect will show for five, ten, or even fifteen years, by increasing fertility. When applying plaster to corn, or plaster and guano, phosphate or hen manure, or even with a small quantity of ashes (in all cases from 100 to 200 weight to the acre is enough of the plaster), the ingredients should be prepared and well mixed on the barn floor, loaded into an open wagon, so as to have it along convenient to the work, and almost any time in the early growth of the corn apply a small handful to each hill, not as some do, by throwing it carelessly in a compact heap near to the hill, but as it is thrown sift through the fingers, giving it an even distribution all about the hill. But after the corn is a little more advanced I believe it would do it more good, and without costing much if any more, to use two or three times as much of the fertilizing mixture, sowing it broadcast over the field. If, instead, the farmer could apply 60 or 80 bushels of ashes to the

acre, it should be done before planting or seeding, so as to be well mixed with the soil when preparing it for the seed-bed. This, I believe, is the most lasting of any kind of fertilizer, and one of the cheapest, too, when the ashes can be obtained without costing more than 25 or 30 cents a bushel. After such an application of ashes, or other fertilizer, or manure, it is still just as desirable as ever to plaster the corn growing on such fertilized land."

Experience with Muck.—A correspondent of the *Country Gentleman* gives his experience with muck as follows: As the attention of farmers is drawn to the necessity of enriching their farms, I will give the result of several years' experience with muck. My practice has been as follows: In the fall, when the muck beds are dry, I throw out into piles as much as I think I need for the coming year. At some convenient time I draw a quantity near the house, where I can throw on it the soap suds from washing, night soil, scrapings from the hen house, and leached or unleached ashes. I generally commence this compost heap in the fall, but if any one would commence in the spring he would make a much larger amount.

In the spring I shovel over the pile once or twice; then it is ready for use. This manure I use in the hill for all hoed crops, as phosphate is used. I consider it far ahead of barnyard manure in the hill, and equal to phosphates, for the nature of manure is to dry up, while the nature of muck is to attract moisture. It is about one day's work for a man to put this into one acre of corn or potatoes, putting a good handful in each hill. I have found that this manure contains an alkali, or something, so that birds and crows will not pull corn, and wire-worms will not eat the roots of corn. White grubs will not gnaw potatoes that are planted in it. It makes a corn crop ripen about one week or ten days earlier than without it. I have known farmers to pay 50 cents a load for muck to make compost from to be used on tobacco, and they thought it paid them well.

I have noticed that the first crop does not use up all the strength of one application. It can be seen in the next crop. It does not hurt seed corn or potatoes to be dropped into this compost, they will grow better than in common earth. This compost heap has some advantages over phosphate. It does not cost any money if one has a muck bed, and it will keep insects away from the roots of crops. I have drawn and mixed barnyard manure and muck in piles during the winter, in the proportion of two of manure to one of muck, and I consider it better than raw manure from the yard for any crop.

What a Pint of Manure Did.—A Wisconsin farmer sends this experience to the *American Agriculturist:* "Last year, in hauling yard manure across a field afterwards planted to corn, some of it scattered off in driblets, from a handful to a pint or so in a place. When planting the corn, I found portions of these droppings, and where noticed, drew them into the hills, and with the hoe mixed them a little with the soil as the seed was dropped. In three instances, where a large handful or about a pint of the manure was thus put in, a stick was driven down to mark the hills. When hoeing, we noticed that in these hills the corn plants had started off more vigorously, were greener, and at the third hoeing they were six to twelve inches higher than the other hills adjoining. Our curiosity being awakened, we followed up the observations, and when gathering the crop each of the three stalks in all the three hills had on it two large plump ears, while the surrounding corn did not average one good ear to the stalk.

"This set us to thinking and figuring. That bit of manure had given the

young corn roots a vigorous start, just as good feed starts off a young calf, or pig, or lamb, and the roots penetrated further in every direction and gathered more food and moisture. These stalks being better nourished from below, ran far away from the poorly fed neighbors. As to the figures, the rows were three and one-half feet apart, and the hills three feet distant in the rows, say four thousand hills on an acre, and four thousand pints of manure is about sixty-two and one-half bushels, or two large wagon loads. Anybody can reckon the difference between six large, well-filled ears of corn on each hill, and less three per hill, and the cost of the manure as compared with the total value of the final crop. The plowing, and the seed, and the hoeing, amount to the same in each case. All I have to say is, that every corn-hill planted on my farm this year will have at least a pint of manure in it."

How to Double the Usual Quantity of Manure on the Farm.—Provide a good supply of black swamp mold or loam from the woods, within easy reach of your stable, and place a layer of this, one foot thick, under each horse, with litter as usual on top of the loam or mold. Remove the droppings of the animals every day, but let the loam remain for two weeks, then remove it, mixing it with the other manure, and replace with fresh mold. By this simple means any farmer can double not only the quantity but also the quality of his manure, and never feel himself one penny the poorer by the trouble or expense incurred, while the fertilizing value of the ingredients absorbed and saved by the loam can scarcely be estimated.

Josiah Quincy, Jr., has been very successful in keeping cattle in stables the year through, and feeding them by means of soiling. The amount of manure thus made had enabled him to improve the fertility of a poor farm of one hundred acres, so that in twenty years the hay crop had increased from twenty to three hundred tons. The cattle are kept in a well-arranged stable, and are let out into the yard an hour or two mornings and afternoons, but they generally appear glad to return to their quarters. By this process, one acre enables him to support three or four cows. They are fed on grass, green oats, corn fodder, barley, etc., which are sown at intervals through the spring and summer months, to be cut as required; but he remarks that his most valuable crop is his manure crop. Each cow produces three and a half cords of solid, and three cords of liquid manure, or six and a half cords in all. Five to eight miles from Boston, such manure is worth from five to eight dollars a cord. From this estimate, he has come to the conclusion that a cow's manure may be made as valuable as her milk.

Advantages of Sheltering Manure.—Many farmers allow the manure made by their stock of cattle to be thrown out doors, where it remains exposed in heaps or in the yard for several months. The rains fall upon it, and streams of black water laden with the soluble and valuable elements of the manure run away from the manure heap during every heavy rain, the sun burns it, and the winds dry it, the volatile gases escape and are lost. In this way a large part of the plant food contained in the manure is lost. That a serious loss is thus occasioned has been proved by experiment. A Scotch farmer and land-owner showed by experiment that covered manure increased the productiveness of his land enough the first year he used it to pay the cost of rough sheds put up to protect it. Four acres of good land were measured off; two of them were manured with ordinary barnyard manure, and the other two with an equal quantity of manure from the covered shed. The whole was planted to potatoes. The two acres manured with barnyard

manure, which had been exposed to the weather, yielded five hundred and sixty-four bushels of potatoes, while the other two acres manured with covered manure, yielded nine hundred and thirteen bushels, or four hundred and fifty-one bushels more than the other. The increased effect of the covered manure did not cease with the first year. The next year both plots were sown with wheat, and from the two acres dressed with the barnyard manure ninety bushels of wheat were harvested, while from the two acres dressed with the covered manure, one hundred and eight bushels of wheat were obtained. These facts show the importance of protecting the barn manure from the weather.

The Fertility of Soils.—The fertility of a soil depends not alone on its composition. A proper mechanical texture is essential. On the texture of soils depends not only their suitableness for the growth of different crops, but likewise the rapidity of their growth. It is the texture, also, which regulates to a just extent the soil's power of absorbing and retaining heat, moisture and manure.

To be fertile the soil must be firm enough to afford a proper degree of support to the growing plants, and yet loose enough to allow the delicate fibres of the rootlets to extend themselves in all directions. It must be loose enough to allow free access of air and suitable drainage, and at the same time close enough to retain sufficient moisture.

Unless there be a sufficiently free passage for the rain throughout the substance of the soil the plant food will not be properly prepared, nor the stationary roots of plants be fed.

The fertility of a soil is also dependent on the climate in which it lies. Local conditions as to rainfall, temperature, etc., must be considered in estimating the value of soils. They may be the same in composition and texture and yet differ widely in value. The amount of rain, the season of its descent determine largely the value of the soil of localities for agriculture.

The temperature of the air in any given locality has an important bearing upon the productiveness of the soil, whatever may be its composition and texture and the amount of rainfall.

Green Manures.—I have never yet been able to make as much barnyard manure as I wanted, writes a Southern farmer, and commercial fertilizers are dangerous things to come in contact with a farmer's pocket, so I touch them lightly; then what is the next best resort? Green manures. In the fall of 1882, I determined to try rye as a fall crop, and I sowed a twenty-five acre lot in it, and the following May I plowed it under, when fully headed, and sowed black peas, one bushel per acre (having used the same quantity of rye). We had a nice pea fallow, and plowed them under about the first of October, and sowed wheat in the latter part of October, 1883. Last year we cut the wheat, and though it had the rust very badly, we made between twelve and fifteen bushels per acre. The growth of the straw was very fine, and I am confident we would have made from twenty to thirty bushels per acre but for the rust, on land that would not, before these green fallows, have made ten bushels of wheat. I now believe you may grow wheat on the same lands every year by following each crop with a pea-fallow, along with ten bushels of lime per acre, applied when the peas are fallowed in. We did not apply any lime on our fallow, as the land had been limed a few years before with fifty bushels per acre. I verily believe the lands can be cropped, as above stated, and constantly improved. We should never buy peas to sow but once, and thus save our seed each year,

even if you have to sow a separate lot for that purpose. I have tried peas as a fallow crop for the past three years, and find them the best and cheapest substitute for barn-yard manures that the poor land farmer can find. They are good to sow on the corn lands, at the last working in June, and fallow in when the corn is cut off in October; and I have been told, by some old farmers, that they will improve the land just as much if left until the frost kill them, and then fallow, as when fallowed under green. If all farmers would use every means in their power to feed and improve their lands, we would soon have a different country from the present.

Bone Dust for Top Dressing.—In reply to a correspondent who asks if bone dust would not make a good dressing for grass land to be applied in the fall, the *American Agriculturist* says: "We think it would be better to compost the bone dust with yard manure and then apply the compost. If six or eight cords of this fine compost were applied to the acre it would only furnish a good dressing of itself, which the land would be the better for, would act as a sort of mulch or protection for grass roots, and if the soil was at all inclined to 'heave,' it would be a positive benefit. But our correspondent must remember that the disadvantage of using bone dust or ground bone alone, as a fertilizer, is the fact of its slow action. The nitrogen and phosphoric acid which the bones contain is very slowly rendered available for plants, on account of their insoluble nature; but where the bone dust is added to yard or barn manure as a compost, the bones cause the mass to ferment somewhat, and the heat engendered liberates the phosphoric acid and nitrogen, which is absorbed by the manure and given out more quickly to plants when brought in contact with them. Good practice and the last scientific authorities have united in recommending this as the best treatment for ground bone and the best manner of its application to plants. Fifty pounds of ground bone to a cord of manure would be sufficient."

Liquid Manure for Gardening.—It is well known that the liquid manure of animals is more valuable than the solids. In all densely populated countries all these are carefully saved and carried direct to the fields, or stored in tanks for future use.

In the West, and indeed all over the United States, but little attention is paid to the liquid wastes of the stables and yards. This has given rise to the saying that "the leaks in the stable are not in the roof." The point is, that it costs but little more in building a stable to provide drainage through which the liquid manure may safely be carried to a tank or a tight-bottomed pond in the yard, than it does to leave the whole without drainage, to rot the foundations and saturate the soil beneath. Once conveyed to the place of deposit, it may be pumped to the manure pile, or carried direct to the garden, the meadow, or fields, where it will pay for the labor expended, ten-fold.

For the garden it is especially valuable, for here the chief expense is in the cultivation. It costs no more to cultivate an acre of thoroughly enriched land than an acre of poor land; in fact, not so much, for on rich soil the vegetation will quickly cover the ground, and thus smother the weeds, while on poorer soil the weeds continue to grow during the whole summer. If no other convenience be at hand, a hogshead may be placed in the wagon, having an orifice at the bottom, to which a hose may be attached, and thus the land may be watered on either side as the team passes through the central drive, which every garden should have for convenience in hauling in

and hauling out manure, trash and produce. If this be not feasible, on account of the small size of the garden, a can with a flat spout, or even large buckets to which a flat pouring place is added, will be speedy and efficient.

Gardeners well know the value of manure, and especially of liquid manure. They spare no pains or price to get all they can, and often apply from 20 to 40 loads of compost or decomposed manure per acre, annually. It is what makes or mars the profit in gardening. The result of the gardener's experience may be easily learned by any farmer who reads, if indeed, it be not so devoted to impractical matter that the proper talent in this direction is not retained. It is just this that makes the difference in the value of any technical journal. If it spread over too much ground, it is efficient in nothing. Just so with the individual. If he engage in three or four separate callings, some of them must suffer. The field of agriculture is broad enough, and in this field there is none more important than the proper saving and application of manure, and especially so in the vegetable garden which no farmer, however few his acres, can afford to be without, especially if he have due regard for the health of his family.

Application of Fertilizers.—Recent experiments have demonstrated that where the application of superphosphates to the soil has produced no effect, the cause was to be attributed to a sufficiency of those salts already existing therein. Where 2 cwts. soil contain less than 3 1-2 ounces of phosphoric acid, the superphosphate will prove beneficial. When it contains 5 ounces of phosphoric acid, the addition of the salt will turn out to be useless. It follows from this that, contrary to the received opinion, it is not necessary to apply nitrates mixed with the phosphates, when the latter are present in the soil. M. Pagnoul continues his interesting experiments as to the solubility of phosphates by diverse agents. He conclusively proves that stable, indeed, we may add barn-yard manure, will dissolve natural phosphates in the powdered state, and thus economize the expensive superphosphates.

A Patent Fertilizer Which Anybody May Use.—This invention relates to a combination of chemicals to be used in connection with dry peat, or muck and unleached ashes, or with any refuse matter having fertilizing properties, to form a fertilizing compound; and it consists in combining dissolved bone, ground plaster, nitrate of soda, sulphate of soda and sulphate of ammonia, in proportion substantially as follows:

Dissolved bone, three bushels; ground plaster, three bushels; nitrate of soda, forty pounds; sulphate of soda, forty pounds; and sulphate of ammonia, thirty-three pounds. This mixture is incorporated with, say, twenty bushels of dry peat or muck, and three bushels of unleached ashes.

The manner of preparing a fertilizing compound from the above ingredients is as follows: The peat or muck and ashes, if such matter be used as the base of the mixture, are thoroughly mixed with the dissolved bone, and the nitrate of soda, sulphate of soda, and sulphate of ammonia, after being dissolved in water, added thereto. The ingredients are next incorporated with the ground plaster, after which the compound is allowed to stand for, say, thirty or forty days, when it becomes ready for use.

The Work of Potash.—Potash is a fertilizing element whose restoration to the soil is indispensable, as it is carried off by crops in considerable proportions. This restitution becomes the more imperative when plants of the leguminous family, such as clover, disappear, to be replaced by mass. Unwashed wood ashes, containing six to eight per cent. of potash, and three

to four of phosphoric acid, often produce marvelous effects; the mass disappears, and the clover and similar plants take its place.

M. Rimpeau, at Schlanstedt, Saxony, and Prince William, at Schaumbourg, have been occupied with the influence of potash on the production of sugar in beets. After the bedding was cleaned in the morning, the boards were strewn with one cwt. of kainite and one-half cwt. of gypsum, per two tons of soiled bedding; the latter, on being removed, was allowed to steep in putrid wine, and in time applied at the rate of eleven tons per acre, to a marly soil. The manure, enriched with kainite, produced a slight augmentation in yield of roots, over the gypsum combination. The salient fact elucidated by Prince William on his estate in Bohemia is, that chloride of potassium exercises no essential action in humid years, while in dry seasons one and a half cwt. per acre secures an increase of three tons of roots per acre; that the salt of potash acts less by furnishing that element to vegetation, than by its absorbing and retaining humidity for the plant.

Ashes in the Compost.—When ashes are used in combination with stable manure, the latter is decomposed too rapidly, but if immediately applied to the land there is no waste, or if covered with loam, the component parts are rendered more soluble and the manure acts with greater rapidity. If the liquid excrement from the cows is mixed with the manure, sufficient soluble matter is thereby supplied for a first crop, and while the crop is growing and maturing, the solid manure has been decomposing and preparing for another crop; or, it may be said, the liquid manure will give the young plant a quick start, while afterwards the solid part will aid in finishing the crop. Ashes do not act so quickly on hen manure as on stable manure, since the former is much dryer; consequently decomposition does not take place immediately. If applied soon after composting, the compound will give good results, but if allowed to remain too long after composting, the ammonia will be lost to some extent. If the compost be covered with fresh loam, there will be no loss, since the loam will absorb the ammonia.

How to Keep and Spread Manures.—It seems to be conclusively settled in Europe that by far the best way to keep manure is to let it remain under the animals all winter, accumulating to a depth of several feet under them, and absorbing all the urine. When thus tramped down firmly it never heats, and is fully one-fourth stronger than when piled out doors exposed to the sun and rain, both of which injure it greatly. The animals are kept clean by abundant applications of leaves, loose straw, etc., for beds.

Mr. Gregory, the great Marblehead seedsman, pronounces night soil or privy manure to be fully fifty per cent. stronger than that of animals. It is too strong to apply separately and requires to be decomposed with stable manure to get the best results. In China, Japan and East, all human manure is carefully saved. There it is carried about in buckets, and is very highly prized as a valuable article. In this country it is recklessly thrown away and wasted, being treated as a nuisance. In no possible manner can the fertility of lands be so kept up as by saving all the excrement from men and animals, voided after eating their food, and returning it to the soil from which it came.

Value of Home-Made Manure.—Of manures, that of the cow is the poorest, that of the horse being double in value, and that of the hog five times that of the horse. Hen manure, mixed with two or three times its own bulk of muck, or even loam, is as good as most guano kept for sale. Ashes,

leached or unleached, are excellent. The contents of the closet may be kept inodorous, and in an easily workable condition, by casting plaster on them frequently until removed, and then by adding four times as much more of muck or loam, you will have a fertilizer equal to poudrette. Bones, old boots and shoes, hogs' bristles, and all old scraps, which would otherwise lie about as nuisances and eyesores to all who see them, may be made soluble and fit for fertilizing by burying them in unleached ashes, with an occasional slight watering and stirring of the heap, and addition of ashes, until reduced to a proper state for pulverizing. The pig should be supplied with all the weeds you can gather before they seed, and peat, muck, turf, etc., if thrown into his yard, he will work over, and pay for his keeping by largely increasing the amount of manure. He will work over ten or twelve loads if given to him.

Clover as a Fertilizer.—A stick of wood burned on the surface mostly passes off in gas, leaving only the ashes; but the same stick if burned in a coal-pit, excluded from the air, forms a mass of carbon of nearly or quite its original size. Now all decay of vegetable matter is a slow combustion, and when this is done under the soil, not only the gases retained in the soil, but more carbon is formed, and this carbon has the power to appropriate the valuable gases always present in the atmosphere. The great value of clover as a fertilizer is due, first to the carbon furnished by the decay of the plant, and second to the fine mechanical effect on the soil, which renders it porous, so that the atmosphere penetrates it and deposits plant food. It is clear that better fertilizing effects will result from the plowing down of the crop to decay in the soil. Ordinarily more can be made out of the tops than they are worth for manure, and if rightly managed, the roots will supply the needed fertility.

Home-made Superphosphate.—A Western journal remarks that almost every farmer has upon his own premises one of the best superphosphate manures known. The elements are found in the old bones, scattered carelessly over yard, garden and farm, and common wood ashes, generally allowed to go to waste. If the bones are gathered, placed under shelter, thoroughly mixed with three or four times their bulk of ashes, kept moist with water enough to make a good lye and occasionally stirred and mixed, they will, in a few months, become so tender and friable that they may be pounded into powder, and in this state they form a valuable manure, better than the average of the commercial fertilizers that seem so expensive. The ashes, of course, should be mixed with the bones. The fertilizer thus made should be applied by the handful in the hill of corn, and its effects may be early seen in the deep, rich green of the growing plant. This may seem like small business to a farmer who has but little spare time, but it is by just such economy that our best farms become so profitable, and it is by lack of such economy that so many farms fail to yield even a comfortable living.

Soap Suds.—The value of this article as a stimulant of vegetable life cannot be too highly appreciated. It contains the aliment of plants in a state of ready solution, and when applied, acts not only with immediate and obvious effect, but with a sustained energy which pertains to few even of the most concentrated manures. When it is not convenient—the most economical method, perhaps, of using it—it should be absorbed by materials which may be used as an ingredient in the compost heap. Suds, muck, and other similar articles, should be deposited where the suds from the sink and

laundry can find its way to them and be absorbed for the benefit of the crops. In this way several loads of manure, suitable for the support and sustenance of any crop, may be made at comparatively small expense. The highly putrescent character of this fermentable liquid qualifies it admirably for the irrigation of compost heaps of whatever material composed. Being a potent fertilizer, it must of course impart additional richness to almost any material to which it may be added. Try it, and mark the result.

Manure for Almost Nothing.—If you have any dead animal—say, for instance, the body of a dead horse—do not suffer it to pollute the atmosphere by drawing it away to the woods or any other out-of-the-way place, but remove it a short distance only from your premises, and put down four or five loads of muck or sods, place the carcass thereon, and sprinkle it over with quicklime, and cover over immediately with sods or mold sufficient to make, with what had been previously added, twenty good wagonloads, and you will have within twelve months a pile of manure worth twenty dollars for any crop you choose to put it upon. Use a proportionate quantity of mold for smaller animals, but never less than twenty good wagon-loads for a horse; and if any dogs manifest too great a regard for the enclosed carcass, shoot them on the spot.

Poultry Manure.—Fifty fowls will make, in their roosting house alone, ten cwt. per annum of the best manure in the world. Hence fifty fowls will make more than enough manure for an acre of land, seven cwt. of guano being the usual quantity applied per acre, and poultry manure being even richer than guano in ammonia and fertilizing salts. No other stock will give an equal return in this way; and these figures demand careful attention from the large farmer. The manure, before using, should be mixed with twice its bulk of earth, and then allowed to stand in a heap, covered with a few inches of earth, till decomposed throughout, when it makes the very best manure which can be had.

An Experiment with Ashes.—An experiment made with five wagon loads of coal ashes on twenty square rods of ground may be cited as an instance of beneficial mechanical effects. The amount of ashes was about two hundred bushels, that is to say, ten bushels to the rod. They were drawn on late in the fall, the ground having been recently plowed. In the spring, the ground was plowed again, thus mixing the ashes with the soil. It was then planted with garden stuffs. All the plants made more growth than in the previous year, when the ground, after being liberally manured, was planted to the same crops. But the favorable change was not attributable to manurial properties in the coal ashes. Before the application the soil was compact and heavy, a fault that the ashes corrected, and without doubt this was practically the sole effect.

Peter Henderson on Fertilizers.—Peter Henderson says that the best known fertilizers of commerce are Peruvian guano and bone dust. Whatever kind of concentrated fertilizer is used, he finds it well repays the labor to prepare it as follows before it is applied to the land: To every bushel of guano or bone dust add three bushels of leaf mold, well pulverized dry muck, yard scrapings, well decomposed stable matter, or, if neither of these can be obtained, any loamy soil, but in every case the material mixed with the fertilizer must be fairly dry, as it is used as a temporary absorbent for the fertilizer.

Top-Dressing.—Some farmers think that top-dressing with manure is best done during the winter. In the fall the manure, unless very fine and evenly spread, will cover up injuriously much of the plant. When spread in winter, on the contrary, it acts as a mulch and a protection while the plant is dormant, neutralizing the effects of freezing and thawing. An authority on the subject advises that artificial fertilizers be spread on grain-lands in the fall, and barnyard manure after the snow comes.

Improving Light Soil.—The best way to improve a light sandy soil is to put on all the vegetable matter you can, either in the form of muck from swamps, or by turning under peas, buckwheat, clover, or some similar crop. If the land is very porous, more or less of the fertilizing materials applied will sink out of the reach of ordinary crops. Your main point is to get the land full of vegetable matter, not only to increase its fertility, but to make it hold moisture in summer.

Liquid Manure.—The liquid voidings of animals are worth more (good authorities say one-sixth more), pound for pound, than the solid excrements, and are saved with greater care by the best European farmers and gardeners. All the leaks in the stable are not in the roof; those often in the floor are quite as objectionable, and are the cause of a great deal of wastage. Make the stable floor tight, with a gutter at the heels of the stock to carry it off to an adjacent tank, or into a heap of muck or other absorbent.

Saving Fertilizers.—One of the most prevalent errors among average farmers is the neglect of making and preserving manure, and also its improper application to the ground. Collect all the refuse material you can, use your chip dirt from the wood pile in absorbing liquids. Apply it to the flat lands at any time during winter. It can then be thrown on broadcast and plowed in as soon as the ground opens. The necessity of returning as much vegetable nutriment to the ground as has been taken off by the crop cannot be too strongly impressed upon the attention of our farmers.

How to Apply Manure.—The old plan of plowing under manure has pretty much been abandoned by many farmers as wasteful. Advanced farming believes and teaches that the intimate and thorough incorporation of the fertilizing principle, into that portion of the soil which is to be occupied immediately by roots of the growing crop, is a truth taught by experience on all soils, and in all climates, and the more evenly and thoroughly this is done the more surely will the crop be satisfactory.

Spreading Manure.—An English writer says: "The wasteful practice of spreading manure on surface of the soil, and allowing it to lie bleaching for weeks, and even months before being plowed in, is still carried on in some counties in England, and stoutly defended by hosts of clay land farmers," and he expresses the opinion that "if the perpetrators of such an enormity be right, science is at fault, analysis is an illusion, and ammonia and all its kindred a family of impostors."

Mixing Manure in Winter.—When teams are not otherwise employed in the winter it is a good plan to draw the pile of horse manure around horse stables and spread it over the heaps of cattle and sheep excrement. The manure of the horse and the cow especially are admirable supplements each to the other, that from the horse being naturally too active and that from the cow too slow. Enough bedding should be placed under horses to absorb all their liquid excrement, so that none be wasted.

Home-Made Guano.—Save all your fowl manure from sun and rain. To prepare it for use, spread a layer of dry swamp muck (the blacker it is the better) on your barn floor, and dump on it the whole of your fowl manure; beat it into a fine powder with the back of your spade; this done, add hard wood ashes and plaster of Paris, so that the compound shall be composed of the following proportions: Dried muck, four bushels; fowl manure, two bushels; ashes, one bushel; plaster, one and one-half bushels. Mix thoroughly, and spare no labor; for, in this matter, the effort expended will be well paid for. A little before planting, moisten the heap with water, or, better still, with urine; cover well over with old mats, and let it lie till wanted for use. Apply it to beans, corn, or potatoes, at the rate of a handful to a hill; and mix with the soil before dropping the seed. This will be found the best substitute for guano ever invented, and may be depended on for bringing great crops of turnips, corn, potatoes, etc.

Materials for Compost.—In several of the States compost heap may be made of muck or earth for a basis; to this may be added leaves, cotton-seed, ashes, gympsum, night soil, stable manure, trash from the fields (except weeds in seed), and all the slops from the houses and cabins. If desired, bone-dust may be added, but the fine artificial fertilizers will be better, if used by themselves.

Value of Vegetable Substances.—The tops of turnips, potatoes, beets, carrots and parsnips are very valuable and should not go to waste. Those of the beets are rich in nitrogen, while potato tops contain a large proportion of potash. All of them contain both in more or less quantity. They rot quickly, and should be added to the compost heap when unfit for other purposes.

Facts Regarding Fertilizers.—The raising of thirty bushels of wheat to the acre will remove from the land fifty-one pounds of nitrogen, twenty-four pounds of phosphoric acid and thirty-nine pounds of potash. This can be replaced by sixty pounds of sulphate of ammonia, 171 pounds of superphosphate of lime, and seventy-seven pounds of chloride of potassium.

Alternating Manure.—Market gardeners find it profitable to alternate stable with other manures rather than use the same kind continuously on the same land. Farmers can take a hint from this. Perhaps one reason why phosphates have been so largely successful has been because the stable manures previously used have been deficient in phosphoric acid.

How to Use Hen Manure.—The manure from the poultry house is valuable for any crop. It may be spread on grass very thinly, about two barrels per acre being enough. One way to get it fine is to spread it on the barn floor and thrash it with a flail, but a wet cloth should be tied around the mouth or nose while this is being done.

Nitrogen for Potatoes.—Potatoes need nitrogen and potash. Fresh manures applied in spring increase the liability of disease. We believe potatoes can be raised profitably with chemicals, when farmers will experiment at home and learn how to buy just what is needed and nothing more.

Nitrate of Soda for Wheat.—An authority avers that an application of 100 pounds of nitrate of soda to an acre of wheat, when the crop looks weak, will show its benefit in a few days, not only improving it in growth, but largely increasing the yield.

Combining Ashes and Bones.—Doctor Nichols gives the following exact figures of the quantities used in reducing bones with ashes: Break one hundred pounds of bones into small fragments and pack them in a tight cask or box with one hundred pounds of good wood ashes, which have been previously mixed with twenty-five pounds of dry, water-slaked lime, and twelve pounds of powdered sal soda. Twenty gallons of water will saturate the mass, and more may be added as required. In two or three weeks the bones will be soft enough to turn out on the barn floor and be mixed with two bushels of good soil. We should prefer road dust to the soil.

Fertilizers a Good Investment.—Farmers who have money at command cannot easily put it in a more profitable investment than judicious outlay on their land. A careful use of good manure repays the expenditure, even during the course of many years, and draining wet land is estimated to return from forty to eighty per cent. on the yearly cost. In the same way good stock pays far better than poor; good fencing, well selected fruit trees, carefully looked-after homesteads, all repay the money laid out, and, besides all that, add immensely to the comfort of the occupier.

Top-Dressing in Winter.—Some farmers think that top-dressing with manure is best done during the winter. In the fall the manure, unless very fine and evenly spread, will cover up injuriously much of the plant. When spread in winter, on the contrary, it acts as a mulch and a protection while the plant is dormant, neutralizing the effects of freezing and thawing. An authority on the subject advises that artificial fertilizers be spread on grain lands in the fall, and barnyard manure after the snow comes.

A Good Garden Manure.—The manure produced by sawdust when used as a bedding for horses, is said to be a better fertilizer for certain garden crops than any other. When mixed with the soil in which celery is grown it is said to greatly benefit those plants.

A Useful Hint.—Coal ashes, scattered on the stable floor, will absorb the liquid manure, prevent the cattle from slipping and falling, afford an excellent addition to the pickings of poultry around the place, and can afterwards be spread on the soil.

Salt and Plaster on Lawns.—A dressing of salt and plaster on newly made lawns will result in great benefit to the young grass roots, making them strong and hardy for wintering over.

Bran as a Fertilizer.—It is said by those who have tried it, that bran is as good as the best commercial fertilizers for potatoes and corn, and much cheaper.

THE GARDEN.

Saving Seeds.—In saving seeds only the best specimens of each kind should be saved, and all inferior ones rejected; this is easy enough with such plants as squashes, cucumbers, tomatoes, melons, etc., care being used to save only the earliest, fairest, and most perfect specimens. The seed should be allowed to ripen thoroughly before taking it from the fruit, which will require some weeks with squashes, after gathering from the vine; tomatoes are placed in the sun for a few days, and melon-seeds may be taken directly when the melon is fit to eat; seeds of this nature having a fleshy pulp are usually cleaned by allowing them to ferment in water for a day or two, when the pulp will easily wash off, after which the seed is spread upon a sheet in the sunshine to dry. Seeds of vines keep longer if not allowed to freeze; they will preserve their vitality five or six years if kept in a warm, dry place. A closet near a chimney is a good place, and, since mice and rats are fond of such tidbits as melon-seeds, it will be advisable to lock them up in a tin chest or other rat-proof arrangement. When saving seeds of beets, cabbage, turnip, etc., those who are most particular reject all but the seed grown on the leading stem. Beet-seed is cleaned by threshing, sifting, and picking over to get out the sticks; it varies much in size, and should be separated by a sieve, in order to have it run evenly through the seed drill, for it is the most troublesome of all seed to sow evenly. Perhaps some inventor will discover a method of shelling out best seeds, so that they can be sown evenly; if this could be done, one of the chief items of labor in raising beets would be greatly lightened, and a saving of more than half the seed would be effected also; for the beet-seed as now sown is a pod containing two to five seeds each, and is so rough and uneven in shape as to give much trouble to sow it evenly with a drill; in fact, to insure a good stand, very heavy seeding and laborious thinning are essential. If the pod could be crushed and the seed shelled out, it could then be drilled in as evenly as any other seed. Seeds of all kinds keep best in a dry, even temperature. When to be kept in large lots, they may be put in bags and hung from the ceiling of the room, to keep them from the mice. Most seeds are good from two to five years, if carefully kept; onion-seed, however, is very inferior after the first year, and worthless after the second. When old seed is to be used, it should be previously tested by sowing a counted lot in a hot-bed or other suitable place, and counting the number of plants that come up, and noting the vigor of the plants; the plants from old seed are usually less vigorous than from fresh seed, and sometimes are so weak as to be worthless.

The Best Garden Vegetables.—The following is an extract from an essay on "Market Gardening," read before the American Nurserymen's Association, at Dayton, O.: Within the past dozen years many important advances have been made in earliness and in quality of vegetables. Among beets we have the Egyptian, which matures at least five days ahead of any other variety, except the Old Bassano, which was too light in color to suit; in cabbages, the Early Summer; and in cauliflower, the Snowball; in celery,

the Golden Dwarf; and the next season is likely to develop a great improvement in the New White Walnut celery—a stout, solid kind, having a rich, walnut-like flavor, and graceful feather-like foliage. In lettuce, the black-seeded Simpson and the White Summer Cabbage lettuce now lead all the out-door varieties. In muskmelons, the Hackensack, of which many thousand acres are grown for the New York market, is almost exclusively planted. In peas, a great improvement is developed in the dwarf variety known as American Wonder, though for general early crop the improved Dan O'Rourke is best. Potatoes vary so much in different localities that it is difficult to say which of the new sorts are most valued; we find, however, that in our general trade more of Beauty of Hebron is planted than any other of the new sorts. In radishes, the Round Dark Red is now the main favorite, while next in order comes White Tipped Turnip. In spinach, the Savoy and the new Thick-Leaved are the best for general crop, though we find that the Savoy should not be sown in spring, as it runs too quickly to seed. Though every year brings out new claimants for favor in tomatoes, it is my conviction that we have not advanced one day in earliness, unless in such varieties as Key's Prolific and Little Gem (which are of poor quality), in twenty-five years, although we have now many varieties somewhat improved in quality. The varieties now most popular with New York market gardeners are Acme and Paragon, though, from the unusual advertising given to Trophy, the general cultivation of that is greater than any other; but, as it is usually found now, it is far inferior to many others, besides being one of the latest.

Rotation of Garden Crops.—Have you not frequently noticed that some men change their garden spots every few years? If you ask them why they do so, they will tell you that vegetables don't seem to do well there after a few years' cropping.

In starting a garden on an ordinary piece of ground, which has not before been used for this purpose, two or three years are required to get it pulverized and enriched sufficiently to produce a first-class crop, hence the necessity for retaining the same piece of ground for garden purposes. This can be done by adopting a proper system of rotation. It is a good plan to make a diagram of the plot used for a garden, and have it marked off into divisions of suitable proportions for the vegetables required. Each division should be numbered, or, what is just as good, the name of the vegetable raised there written upon it. These diagrams drawn each year should be carefully preserved, so that, by referring to them, one could ascertain just what had been raised on each particular division for years back, and by this means keep up a systematic rotation.

For convenience, the garden-plot should be long and narrow, thus enabling a horse cultivator to be used to advantage. I have noticed that most gardens are nearly square in form, but have never yet been given a good reason for this.

A garden 8x20 rods in size can be cultivated with a horse at less expense and with less work than a garden 3x4 rods can be worked by hand, as gardens of this size usually are.

Such garden vegetables as rhubarb, asparagus, and others of a like kind, requiring two or more years to reach the proper bearing condition, should, of course, be given a permanent place for several seasons; but they, too, need removing about once in four years, in order to get the best possible results. They should never be so located as to interfere with the cultivation of other vegetables.

Many gardeners put these plants among their small fruits, but they are as much in the way there as anywhere in the vegetable garden. They will not do so well, and are also a heavy drain on the soil, causing an injury to the bushes about them. The best way is to give them one of the long, narrow divisions, above referred to, clear through the length of the garden.

How to Make a Good Garden.—The soil must be well drained, either naturally or artificially. It must be rich; and the manure should be thoroughly worked into the soil. Plow the land in the autumn, and plow it again as early as possible in the spring. If there is any rubbish, remove it or dig holes and bury it below the reach of the plow. Then plow again, or work the land with a cultivator. I take off some of the inside teeth of the cultivator, so that the horse can draw the cultivator as deep, or nearly as deep, as the land has been plowed. This work should be done when the soil is dry and the weather warm. You cannot possibly stir the soil too much while the sun is shining. It lets in the sun's rays and warms and mellows the soil. On light, sandy soil, thoroughly and deeply plowed and manured the fall previous, there are many crops which can be sown to advantage without again plowing in the spring. It often happens in this latitude that five or six inches of the surface soil in the spring is thawed out and dry enough to work, while underneath the ground is frozen solid. If we wait till this frozen soil can be plowed, we frequently lose a good opportunity for putting in early crops of peas, potatoes, onions, cabbage, lettuce, radish, spinach, etc. And besides, the soil that we turn up with the plow, and which comes to the surface, and in which we sow the seed, is cold and damp, while the surface soil which we turn under is warm and dry.

Transplanting.—Inexperienced gardeners are apt to think that a rainy day is the only fit time for setting out plants, and will often delay a week or two longer than is necessary waiting for it, and finally plant when the ground is soaked and when they sink to their ankles in the soil. That is the worst time that could possibly be chosen, excepting when the ground is congealed with cold. For it is impossible that the mold, sticky and clammy while wet, can filter among the roots, or remain of suitable texture for them to spread themselves in, permeable to them and equally pervious to the air in every part without anywhere exposing their tender parts to actual contact in chambers of corrosive oxygen. A rainy day is an advantage if the plants are set before the ground has become wet, but the safe and sure way is to go for the plants as soon as the ground is fully prepared, no matter how dry the weather. A pail or bucket should always be taken to carry the plants in, having a little water in the bottom. The roots being set in this will absorb until the plant is so gorged that it will endure a drying air after being set in place. If the ground is very dry, water should be poured in before planting, which is very much better than pouring upon the surface, because of no injurious crust being formed, for a continually open surface during the growing season, to admit of free circulation of air and capillary action from below, is absolutely essential to free, profitable growth.

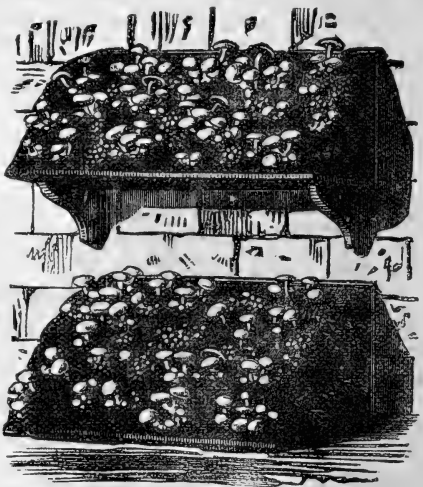
Mushroom Culture.—Of all the edible mushrooms, the common Meadow Mushroom *(Agaricus edulis)* is the only one adapted for culture, and, with proper care and management, it can be grown almost anywhere and at all seasons. Nowhere has the cultivation of this delicacy reached so high a state of perfection as in the vicinity of Paris, in France, and the following description of the methods practiced there, given by Messrs. Vil-

morin-Andrieux, will, therefore, be of interest to those who contemplate mushroom culture:

The chief conditions to obtain a satisfactory result consist in growing mushrooms in a very rich soil and under a genial, as nearly as possible even, temperature. To secure this latter condition, the culture is often carried on in cellars; but any other locality, such as sheds, out-houses, stables, railway arches, etc., will suit as well, provided that either naturally or by artificial means the temperature does not exceed 86 degrees, nor fall lower than 50 degrees Fahr.

TUB.

The first thing to be considered after the choice of a convenient locality is the preparation of the mushroom bed. The most essential material being horse droppings, preference to be given to those of well-nourished animals, collected as dry and as free from straw as possible. This fermenting material would be too hot to be used by itself at once; to reduce the strength it should be well mixed with one-fourth or one-fifth of its bulk of good garden soil, when the bed may be prepared immediately, the fermentation being slow and the heat produced only moderate and even. Care should be taken to construct the bed in a dry place, and to make the sides firm and tidy. If it is intended to use the horse-dung by itself, as the mushroom growers around Paris do, it is necessary to allow the first heat to evaporate, which is done by piling the droppings as they come from the stable in successive layers to the height of about three feet, in a dry spot, removing all foreign matter from it and pressing it into a compact mass, sprinkling with water such portions as are very dry. In this state it is to be left till the most violent fermentation has passed, which is generally the case in six to ten days, when the heap is to be remade, taking care that those portions which were *outside*, and consequently less fermented, are placed *inside*, to insure an equal temperature. It should be well mixed and firmly placed, so that the whole may be of a similar texture.



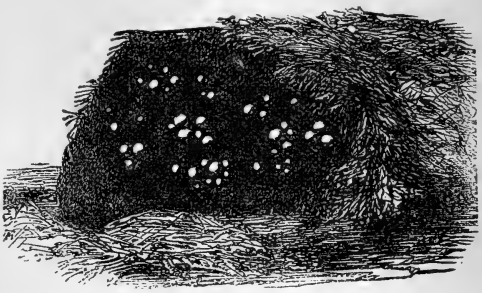
MOVABLE BEDS AGAINST A WALL.

Generally, a few days after being remade, the fermentation is so strong as to render it necessary to be made up a third time.

Sometimes, after the second operation, it is ready for the beds being

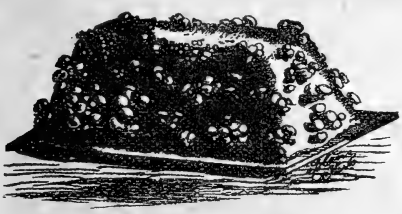
made, which may be seen when the heating material has become brown, the straw which is mixed with it has lost almost entirely its consistence, when it has become greasy, and the smell is not longer the same as when fresh. It is difficult to obtain a good material without preparing a heap of at least three feet each way; and if that quantity is not required for making the beds, the surplus may with advantage be used in the kitchen-garden.

The material is now brought to the place where the beds are to be made, which may be of any form and size; but experience has shown that the best way to make use of space and material is to raise the beds to a height of from twenty to twenty-four inches, with a width of about the same at the foundation. An excessive rise of the temperature, in consequence of renewed fermentation, is to be less feared than when the beds are of larger dimensions. When a large place is at disposal, preference is given to beds with two slanting sides; when the beds are resting against a wall, and consequently present but one available side, the width ought to be less than the height.



BED WITH TWO SIDES PARTIALLY UNCOVERED.

Barrels sawn in two, so that each part forms a tub, are well adapted to form beds, as well as simple shelves on which sugar-loaf-shaped beds may be raised, which, already formed, may be carried into cellars, etc., where the introduction of the raw materials would be objectionable.



MOVABLE SHELF.

The beds thus established should be left for a few days before spawning, to see whether the fermentation will not be renewed with excessive vigor, which may be ascertained by the touch of the hand, but it is safer to use the thermometer; as long as the temperature exceeds 86 degrees Fahr. the bed is too hot, and it should be allowed to cool by itself, or by making openings with a stick to allow the heat to escape.

When the temperature remains at 76 degrees, it is time for spawning. Prepared spawn is found in the seed stores at all times, which may be kept without trouble from year to year. The spawn sold in France is not in bricks or solid lumps, as in England, but in light masses of scarcely half-decomposed loose and dry litter.

A few days before spawning, it is advisable to expose the spawn to a moderately warm moisture, which will insure a safer and more rapid growth; it should be broken up in pieces about the length and thickness of the hand

by half that width, and inserted into the bed at a distance of ten to twelve inches each way; on beds twenty to twenty-four inches in height, which are mostly in use, it should be inserted in two rows, dove-tail fashion.

Where the bed is situated in a place under cover and of an even temperature, nothing else is to be done but to wait for the growth; if, however, the bed is placed in the open air and exposed to change of the weather, it must be covered with long litter or hay to keep a uniform temperature all around the bed.

Under favorable circumstances, and if the work has been done well, the spawn ought to show activity in seven or eight days; it is advisable to look to it, and to replace such spawn as might not thrive, which can be seen by the absence of white filaments in the surrounding materials.

Fifteen to twenty days later the spawn ought to have taken possession of the whole bed and should come to the surface; the top and sides of the bed should then be covered with soil, for which a light mold in preference to a heavy one should be used, slightly moistening it, without making it too wet. If it does not naturally contain saltpetre, it would be good to administer a small quantity of salt or saltpetre, or to give it a watering of liquid manure.

The covering with soil should not exceed more than an inch in depth, and be pressed strongly so as to adhere firmly; watering should only be done where the soil becomes very dry. Where a covering has been removed for some purpose it must be replaced at once.

A few weeks after, according to the state of temperature, more or less, the mushrooms will appear. In gathering them care should be taken to fill the empty spaces with the same soil as used for the covering. Leaving the bed to itself, it will produce from two to three months; but its fertility may be prolonged by careful waterings at a temperature of 68 degrees to 86 degrees Fahr., with an admixture of guano or saltpetre.

By establishing under cover three or four beds annually in succession, a continued supply may be reckoned upon; besides, during the summer months, beds may be raised out-of-doors at very little expense, securing an abundant supply. Frames in which vegetables are forced may in the intervals be used for mushroom culture with very good results, providing the temperature be congenial, and that the young mushrooms are slightly protected with soil as soon as they appear.—*The American Garden.*

Asparagus.—A writer in the *Massachusetts Ploughman* says: I desire to impress upon the attention of our farmers the importance of using asparagus more largely as a luxury of the table. It is more rarely to be found in country gardens than any other esculent, and when found hard to take note of, as the plat is scarcely bigger than a door mat and furnishes about enough shoots for one square meal. When an expenditure of two or three dollars will provide a bed which will last twenty or twenty-five years, and annually furnish one of the earliest and most delicious vegetables, it seems almost impossible to account for its being so much neglected by the farming community. It is not only an appetizer and a luxury but a very valuable diuretic, and especially beneficial to sedentary persons and all who are troubled with symptoms of gravel. Our best growers make a bunch of sixteen stalks weigh four pounds. Almost every one who cultivates vegetables knows how to make an asparagus bed, but the opinions as to its after treatment are very discordant. For a private family the bed should not be less than five feet wide and twenty feet long. Dig out the ground two, or better, three feet deep, and fill up with chips, sawdust or sticks of wood packed

close together five or six inches from the bottom. Put on this six inches of the strongest stable manure, and fill up to the top with manure and dirt, about half and half. The whole space need not be dug out at once, but the bed can be made in the usual mode of trenching. The roots may now be put in over the entire bed ten inches apart, or in single rows two feet apart, and ten inches plant from plant, and then covered with rich soil about three inches deep, and over the whole a peck of salt and a peck of ashes mixed together, sown.

Asparagus, being a marine plant requiring salt and alkalies for fertilizers, needs in most localities an annual supply of these materials, though cultivators living within the influence of the sea-coast say they can find no benefit in using salt. The beds, of course, are to be kept clean at all times, and an abundant supply of liquid manure from the stable or washroom during the summer will be found the best method of manuring. The ordinary method of after culture in this country is to let the stalks grow until November, then cut them down. Cover the bed with coarse manure, and in the spring fork it in. In France the stems are cut down to about thirteen inches. In England they do as we, cutting down to the ground, but uncovering the stools, so as to leave on only a very slight covering of soil. Now, for small gardens in which asparagus is grown for family use, I doubt the propriety of cutting down the stalks in the fall, and consider it the best plan to let them stand until spring, and then put on the bed all the old pea-brush or other loose dry material, and burn them and the stalks together, and the ashes will furnish all the manure required, and the bed go on improving indefinitely. The practice of the Romans was to "burn the haulm in its own place." And later authorities say, "Cut the dry tops close early in the spring, spread and burn them evenly on the ground, hoe and rake the beds over, and you will have large crops for twenty-five years." Not far from my residence is an asparagus-bed which the present owner, now an octogenarian, helped make more than half a century ago. The only manuring it has received for the latter half that period is the annual spring burning of the stalks and refuse material on the bed, and it is not only vigorous, but improving, sending up new shoots to fill the vacant places occasioned by too late cutting. If this practice works well in Berkshire, where the frost descends to the depth of several feet, and asparagus-beds are not injured, though covered with nothing but the haulms, during such a winter as last, when the white mantle of snow was wanting, it would seem to be adapted to any climate.

The greatest injury to beds of asparagus is cutting too late. Cut all the shoots at a suitable age up to the 20th of June. Always cut below the surface. In Spain, previously to the cutting, the bed is covered lightly with dead leaves to the depth of about six or eight inches, and the cutting does not commence till the plants peep through this covering. In France the cultivators form over each stool a conical lump of soil, like a large mole-hill, ten to twelve inches high, in early spring or soon as the ground is dry, and the asparagus is gathered when it pushes an inch or two above the hills. In the climate of Paris the cutting is never prolonged beyond the middle of June. The experience of nearly all who grow this vegetable is, that if some shoots are not allowed to go to seed, the plants will soon become weakened, and die.

Celery.—Our manner of treating the celery crop of late years is very much simplified, says Mr. Peter Henderson. Instead of sowing the seed in

a hot-bed or cold frame, as practiced in Europe, it is sown in the open ground, as soon as it is fit to work, in April, and kept carefully clear of weeds until the time of planting, in June and July. In our warmer climate, if raised in hot-beds, as in England, a majority of the plants would run to seed. The tops are shorn off once or twice before planting, so as to insure "stocky" plants, which suffer less on being transplanted.

After the ground has been nicely prepared, lines are struck out on the level surface, three feet apart, and the plants set six inches apart in rows. If the weather is dry at the time of planting, great care should be taken that the roots are properly "firmed." Our custom is to turn back on the row, and press by the side of each plant gently with the foot. This compacts the soil, and partially excludes the air from the roots until new rootlets are formed, which will usually be in forty-eight hours, after which all danger is over. This practice of pressing the soil closely around the roots is essential in planting of all kinds, and millions of plants are annually destroyed by its omission. After the planting of the celery is completed, nothing further is to be done for six or seven weeks, except running through between the rows with the cultivator or hoe, and freeing the plants of weeds, until they get strong enough to crowd them down. This will bring us to about the middle of August, by which time we have usually that moist and cold atmosphere essential to the growth of celery. Then we begin the "earthing up" necessary for the blanching and whitening of that which is wanted for use during the months of September, October, and November. The first operation is that of "handling," as we term it; that is, after all the soil has been drawn up against the plant with the hoe, it is further drawn close around each plant by the hand, firm enough to keep the leaves in an upright position and prevent them from spreading. This being done, more soil is drawn against the row (either by the plow or hoe, as circumstances require), so as to keep the plant in this upright position. The blanching process must, however, be finished by the spade, which is done by digging the soil from between the rows, and banking it up clear to the top on each side of the row of celery. Three feet is ample distance between the dwarf varieties, but when larger sorts are used the width of the rows must be at least four and a half or five feet.

An Easy Method of Blanching Celery.—The common and laborious process of earthing up and winter storage of celery is doubtless a great obstacle in the way of its culture by many busy farmers. The *Country Gentleman* suggests this easy method of blanching, which does away altogether with the necessity of trenches or banking, at least for moderate supplies: "If intended for winter blanching, about the middle of November they are taken up on a dry day and placed in water-tight troughs or other vessels in a quite dark cellar, the plants standing erect and closely together. Enough water is poured on the roots to cover them, and the supply is continued through the winter as it evaporates. This constitutes the entire labor. The stalks are gradually and handsomely blanched in the darkness, and many new ones spring up during the winter months, especially if the apartment is not very cold, and these new shoots are remarkable for their delicacy and perfect freedom from any particle of rust, appearing like polished ivory. A small separate apartment in the cellar, without windows, answers well for this purpose. Boxes, tubs, or any vessels which will hold a few inches of water may be employed. The plants, as grown in the open ground, need not be earthed up at all, or they may be slightly earthed to bring them into

a more compact form, if desired. Probably the best way would be to adopt the course which is sometimes employed of setting out the plants in summer on the level surface of deep, rich soil, eight or ten inches or a foot apart each way, in order that their close growth may tend to give them a more upright form. They are merely kept clean by hoeing through the season.

Cauliflower.—The growing of cauliflowers is receiving more attention than formerly, particularly so the earlier varieties. The crops of Dwarf Erfurt and Snowball begin to come forward in June, and these, with the later sorts, are in market almost without intermission until November. Cauliflowers require very high cultivation, even more so than cabbages, and plenty of moisture. Whether grown in the kitchen garden or upon a large scale, the crop is a paying one. The demand is evidently rapidly increasing, and there is no more delicious vegetable grown.

Cold-frame plants are probably the best and hardiest for early crops; the frames, however, need rather more protection during cold nights than is required for cabbage plants. Seeds sown in hot-beds in February will produce plants that are not much, if any, inferior to cold-frame plants. They should be transplanted out once before setting in the open ground, and also should be gradually hardened by exposure; in this way they may be in condition to set out as early in April as the ground will permit. Set the early sorts about two feet by fifteen inches, and cultivate the same as cabbages. Where irrigation is practicable, great advantage is thus obtained during a drought.

For late cauliflowers, sow seed in open ground, from the middle of May till the middle of June, in hills, the same as directed for late cabbages. Thin to one plant in each hill; this avoids the drawbacks resulting from transplanting in a dry time. When the plants first appear, they are liable to the attacks of a small black fly; guard against this by frequent dusting with plaster, which apply in the morning, while the dew is on. When the heads are forming, tie the leaves together at the top, thus avoiding discoloration by exposure to the sun.

Tomato Culture.—Perhaps no other garden vegetable, says a competent authority, has grown more or faster in public favor than the tomato. It is one of the most profitable garden crops, if cultivated right and got into the market early. I have made tomato culture a special study for the last six or seven years, endeavoring to grow the best and earliest tomatoes. I would get all the new varieties I could to test, cultivating them in the best way according to my knowledge and judgment to make the vines produce the earliest and nearest perfect fruit. I will give the mode of cultivating that I have found to be the best and most profitable way as yet.

Start the plants in a hot-bed; sow the seeds in a box large enough to hold the required number of plants wanted; sow in this box in rows one or two inches apart the seeds thick, and insert in the hot-bed up to the top. When the plants have four or six leaves, transplant in another hot-bed four inches apart. Notice that the beds are the same or near the same temperature. The transplanting is done to give the plants more room and give them abundance of roots. The plants should be hardened by taking off all cover, or if sash is used raise them of a warm, clear day. When all danger of frost is past, transplant to the open ground. Break the ground deep and work it mellow, mixing with the soil all the manure that can be spared from other crops, for the richer the soil, if it is warm, the better. Mark off the rows five feet apart; put one or two shovelfuls of rich, well-rotted manure every

three feet in the rows, working it well with the soil, and set the plant some deeper than it was in the bed. Before taking the plants up, wet the bed thoroughly, and take up as much soil with the plant as you can. Set in cloudy weather, if you can, if the weather is warm. The least check the plants receive the better. As soon as they start to grow, begin to cultivate them. Cultivate the balk or space between the rows, deep and thoroughly, raking the ground level. Cultivate every three days, if the weather will admit. Remember, tillage is *earliness!* Tillage is *manure.*

As soon as the laterals or suckers appear keep them off. At the second or third cultivation top-dress the ground with hen manure and work it in the soil. If you have but little hen manure, just put it around the hills. Keep the vines nicely and well tied up to stakes. As soon as the fruit begins to form, go through the vines and keep all imperfect, deformed fruit off and all laterals. Sell by the number, three to five cents each. Sell to the consumer; they are the ones to appreciate nice fruit, and will pay for it too.

As soon as the fruit is grown let the suckers alone; they will give you fruit later. Varieties—Perfection, Paragon; or Acme is very nice, but I prefer the two first.

Training Tomato Plants.—There is no doubt that a greater quantity of desirable fruit is obtained when the branches of each tomato plant are elevated on brush or frames, as the fruit is by this means exposed to sun and air; oftentimes only one stake is employed; any arrangement that brings about the required exposure and keeps the fruit from the ground will serve a good purpose.

The maturity of the first fruit that sets may be greatly accelerated by pinching off the extremities of the tops and the surrounding shoots that appear. A good rule is to stop side shoots at the first blossom.

A novel method of training the tomato plant appeared in a report of the Maine Pomological Society. Stakes seven or eight feet long were inserted in the ground the last of May, three feet apart, in a warm, sheltered location, and strong tomato plants were procured, which had been started under a glass and contained one or two blossom buds. These were planted near the stakes. The plant was then tied to the stake with listing, and all the side branches which had pushed at the axillar or angles formed by the separation of the leaves, were pinched or cut out with scissors, so as to compel the plant to grow on a single stem; and every week during the season, these branches were removed, and the stems, from time to time, were tied to the stake. When a sufficient number of clusters had been formed, the remainder were removed, so as to concentrate the whole energies of the plant to the growth and ripening of the remaining tomatoes; and the heavier branches were supported by tying them to the stakes. It was claimed for this method that the ripening of the fruit was not only hastened, but its size increased.

Late Tomatoes.—To raise late tomatoes a good plan is to stick into each watermelon hill a tomato plant. They do not interfere with the former, and come in after the garden crop gives out. Those coming in late are the best for canning and putting up for winter use.

Onion Growing.—A successful gardener writes: Let me say to those who, by reason of repeated failures, have become discouraged, and abandoned the growing of onions, that if they will put the following directions in practice they will be astonished at the result. One of the most important and first considerations is the soil, for it is of no more use to try on unsuit-

able soil than it is to "spit against the wind," and if you attempt it you will only "get your labor for your pains." The soil must be clean, rich, and light, not a gravelly kind, or one so dry as to suffer from drouth—sandy loam is the best. Next, the ground should be heavily salted, and this well worked in before sowing. The sowing should be done in April, and as early in the month as possible; "delay is dangerous." With a heavy roller, or the feet, or in some way, the ground in which the seeds lie should be pressed down quite hard. Weeding should be attended to as soon as you can safely do so, and as often as the grass (which is the only weed that will be likely to appear if the ground has been heavily salted) appears and is large enough to pull (the smaller the better), being careful not to throw earth upon the onions in any way or at any time during their growth. Follow these rules, and if weather favors, success is certain, and the weather must be quite unusual to cause failure. The tops should be left on the bed or field to rot, or to spade or plow in; and onions improve by being grown on the same ground year after year. While I believe it to be better to work the soil up fine for the reception of the seed, and after sowing to press the ground down hard upon the seed, yet I have known very good crops grown by making a groove or furrow with a sharp instrument in unplowed ground, covering the seed with the earth thrown out by the process, pressing it down, a heavy coat of manure having been applied as a top dressing the fall before, and raked or burnt off before sowing. Top dressing is a good practice for onions, whether the land is plowed or not. Plow shallow if you plow at all.

A New Method of Raising Onions.—A new method of onion-growing is strongly recommended by a French horticulturist. Some of the seedlings in the original bed should be left standing at intervals of about a couple of inches, and the spaces between them caused by the removal of the rest, filled in with good garden mold mixed with pigeon's dung, or ordinary fæces. The beds must be kept well watered, and it is said the resulting crop will astonish the grower.

Keeping Winter Squashes.—Many farmers are at a loss to know how some are successful in keeping their squashes in good condition, until May or June, while they lose most of theirs before the end of February; they usually attribute their want of success to causes beyond their control, when a careful investigation would show that mismanagement was the principal cause. Squashes to keep well must, first, be well ripened; second, they should be gathered before heavy frosts come; third, should be well dried; fourth, the shell should be well glazed over, and while it need not be thick it should be hard; fifth, they should be kept where the temperature is very even, never very cold, or very hot; sixth, in handling, great care should be taken not to bruise them; this is of the highest importance. Many farmers leave their squashes out until the frost kills the vines; the squashes are thus left exposed to the cold winds, and they are frequently left until it is cold enough to freeze water, and change the color of the tops of the squashes; this is fatal to their good keeping. Others, when they find that cold weather has come, hurry them in just as night sets in, and in their haste to get them under cover, they load them into the wagon as though they were stones; thus bruising nine out of every ten to a degree that causes them to rot by Thanksgiving time.

Squashes are often stored in the barn, in one heap, until they get chilled, when they are carried into a warm, damp cellar, where they soon rot, and

the owner is at a loss to know the reason. When stored in heaps, if the storehouse be dry, the under squashes will send out moisture in such quantities as to keep the whole heap surrounded by moisture. Squashes to keep well, should not only be kept in a dry atmosphere with a very even temperature, but they should be spread on the floor, or on shelves, so that the air can easily pass between them.

All of the soft shell and unripe squashes should be disposed of as soon as possible after they are harvested, and only the hard shell and perfectly ripe ones should be kept for winter; crookneck squashes keep best with most people; the reason probably is, they are ripe and are handled with care, and are usually hung up in a dry place. The same treatment of marrow squashes would no doubt secure very satisfactory results.

Squash Culture.—A successful raiser of squashes says he manages in this way: I dig holes as deep as I conveniently can with a hoe, six feet apart, close by the side of early peas or potatoes. As soon as the weather will permit I stamp a wheelbarrow of unfermented manure in each hole, pour in a pail of water, and haul over the manure six inches of earth, being careful that the hill is no higher than the surrounding surface. Plant ten or twelve seeds in each hill; when they begin to run, thin to two vines in each hill. The potatoes will be fit for family use before the squashes begin to run, and can be dug ahead of them, leaving the ground mellow, so that the squash vines will root at every joint. This is a great saving of ground in a small garden. Train them all one way.

Experiments in Melon and Squash Culture.—A practical gardener makes the following statement: "Last year, as a test of a frequent practice among growers of melons and squashes, I pinched the ends of the long main shoots of the melons, squashes, and cucumbers, and left some to run at their own will. One squash-plant sent out a single stem reaching more than forty feet, but did not bear any fruit. Another plant was pinched until it formed a compact mass of intermingling side-shoots eight feet square, and it bore sixteen squashes. The present year a muskmelon-plant thus pinched in, covered the space allotted to it, and it set twenty-three specimens of fruit; the most of them were pinched off. The pinching causes many lateral branches, which latter produce the female or fertile blossoms, while the main vines produce only the male blossoms. The difference in favor of the yield of an acre of melons treated by this pinching process may easily amount to 100 barrels."

Hints on Melon Culture.—A correspondent at Brighton, Ill., writes to an agricultural paper: "Of course everybody who knows anything at all about melon culture understands that melons do best on warm sandy land, but everybody, perhaps, don't know that I have raised fine melons on heavy clay soil. I put the land in first-rate condition and fertilize in the hill with well-rotted barnyard manure. I also raise the hills a few inches above the level to make the ground warmer and dryer. I never put seed in the ground until the weather is settled and the soil is dry and warm. I use plenty of seed, so as to insure a good stand. The very day the vines begin to show green above ground I begin sprinkling the hills with bone-dust, which operation I repeat every day until they are out of reach of the striped bug, that foe to melon patches. Now I don't say that sprinkling with bone-dust is a sure preventive in all cases to the bug, but it has proved a paying application to me. I have had fewer bugs in my melon patch since I began using

it, and it also acts as a tonic to the vines, making them more vigorous. I do not confine the applications of bone dust to melon vines, but use it wherever I fear the striped bugs."

A New Method of Watermelon Culture.—A correspondent of the *Rural New Yorker* describes the following method by which an extraordinary crop of watermelons was raised: Holes were dug ten feet apart each way, eighteen inches square and fifteen inches deep. These holes were filled with well-rotted manure, which was thoroughly incorporated with the soil. A low, flat hill was then made and seed planted. When the vines were large enough to begin to run, the whole surface was covered to the depth of a foot or fifteen inches with wheat straw. The straw was placed close up around the vines. No cultivation whatever was given afterward; no weeds or grass grew. The vines spread over the straw, and the melons matured clean and nice. The yield was abundant, and the experiment an entire success. This is surely worth trying.

Boxes for Melons and Cucumbers.—It is a good plan to make boxes, say twelve inches square and eight inches high, without bottom or top; these, placed over the cucumber or melon hills, and covered with grass, give an impetus to the plants early in the season that nothing short of a hot-bed will effect. If very early, place a little fresh manure around these boxes to keep the contents warm. It is astonishing what an effect this simple contrivance will produce; and not only is it valuable for protection from the cold weather, but it is equally valuable as a protection from melon bugs and other predatory insects that seem to watch for our choicest esculents.

Cucumbers on Trellises.—No one who has not tried it can have any idea of the luxurious growth of a cucumber when trained on a stake, which has a set of stubby side branches left along its length, and the crop on some so trained was enormous. By this the vines occupy less space, and it is the natural habit of the cucumber to climb instead of trailing on the ground.

How to Grow Early Cabbages.—A successful gardener writes: I sow the seeds of the kinds I wish to grow in February or first of March, in small or shallow boxes, in forcing-pit, hot-bed, or if these are not to be had, a sunny window of the house will do. The boxes I use are eighteen by twenty-four inches, three inches deep, made of one-half inch boards. The kinds of early cabbage I generally raise are Early Jersey Wakefield (best if pure), Winningstadt, Early Summer and Fottler's Early Drumhead. The first two for early, the others for second early. I only treated the first two as above stated; the second early I sow in common hot-beds from the 1st to the 15th of March. After the seeds sown in boxes are up and about three inches high, it is necessary to transplant them in other boxes, like those they were sown in, about one and a half to two inches apart every way; or put one plant in each pot, and pots close together in boxes, treating the same as if planted in boxes. Pots are better than boxes, and I use them largely. About one week or ten days before planting in garden, they must be hardened off by exposing gradually, night and day, in the open air. I set my plants the end of April or beginning of May. The plants which are in boxes are taken in the boxes to the part of the garden where the ground is ready to plant. Plant Wakefield twenty inches in rows and Early Summer the same; the other kinds twenty-four inches. The rows should be thirty inches apart, so that a cultivator can be used. Early radish, lettuce, spinach, etc.,

can be sown between the cabbage rows, and be out before the cabbage needs all the room. After cabbage, celery can be sown, on the same ground. In this way other vegetable plants can be raised to advantage. In fact, I have raised all the following with success: Early cauliflower, early lettuce, early kohlrabi, early savoy, early celery, early beet, early tomatoes, early cucumbers and early squashes.

Fertilizer for Cabbage.—"I find," says a writer in the *New England Homestead*, "that cabbage needs more hoeing and stirring of the soil than almost any other crop. Neither do I approve of too much stable manure, except for an early crop, for it has a tendency to dry the soil and does not furnish potash enough. I had much rather have tobacco stems or stalks, cut up fine and plowed under broadcast, with some chemicals in the drill, for a medium or late crop. As to chemicals, whether to be used alone or in combination with other manures, I recommend this formula as being best and cheapest, which every farmer must make for himself: Two hundred pounds of dry ground fish, two hundred pounds of bone meal dissolved in sulphuric acid, two hundred pounds castor pomace and one hundred pounds of muriate potash, or more if the potash salts (kainit) are used. The fish and castor pomace furnish ammonia in quick and slow forms; the bone, phosphoric acid; while the potash is very necessary to a cabbage crop. A ton of this mixture costs about $40, and is sufficient for an acre with light manuring, or half the quantity if manure is used liberally. This is the best cabbage grower I have found. With it and tobacco stalks, used as described, I raised cabbages that weighed over twenty pounds. One dozen, as they were taken to market, weighed over two hundred pounds."

Novel Method of Growing Cabbages.—A novel plan for setting celery and cabbage plants which has several desirable points to recommend it, is to place them between the rows of your potatoes or sweet corn after the last hoeing. The growing corn or potatoes will afford a partial shade which is very desirable at the time of setting the young plants and until they get fully established, and yet ripen and can be removed in time for them to occupy the ground as a second crop. Two crops on one piece of ground with ten dollars' worth of labor and manure will afford more profit than one crop on which five dollars are expended.

Parsley.—No garden is complete without a parsley bed, and nothing looks prettier or more ornamental. It is not only useful in soups, but for garnishing dishes of meats and vegetables it cannot be surpassed. The only objection to it is its slow germination. As a small bed of parsley is sufficient for a family garden, the labor necessary to its cultivation is trifling, as the attention to a few square yards of ground can hardly be considered an encroachment upon regular work. It is a native of Sardinia and loves warm weather, but owing to the length of time required for the seeds to germinate, it should be sown very early. It the seed is soaked for twenty-four hours in warm water, previous to sowing, they will sprout in shorter time, or, what is better, mix them with earth dampened with warm water, and keep near the stove in a box until the seeds burst. The earth in the box should not be allowed to become dry from evaporation, but the moisture should be kept by frequent additions of warm water, care being observed not to have it too wet. The ground should be very rich, with well-rotted manure if any is used, spaded deep and fine, and well raked, in order that not the smallest lump or stone may remain. Then sow the seed in rows, mixed with radish,

and cover lightly. As the radish will soon push through and show the rows, the grass can be kept down with the hand.

Spinach.—Spinach, though an aristocratic crop on some accounts, may become also the one crop of the masses for early use, if they will only grow it. And this is the way: Wheel some manure upon the patch where your early garden peas were, spade the ground thoroughly, mark it off in drills eighteen inches apart and an inch or so deep, and sow to spinach. That is all there is to it. Sow the seed thickly in the rows, and when it has attained sufficient size to thin out, what a delicious dish of "greens" you will have this fall, at a season, too, when, although green things are generally no rarity, yet, because of their extreme delicacy and lusciousness, you will esteem them a great and rare treat. Then with the on-coming of freezing ground, cover with straw or litter of any kind. Let this remain till after the frost is out of the ground in the spring, when it may be taken off, and, with the first tulips of your flower garden, you will also have spinach greens for your dinner—a most delicious and healthy dish. Moreover, if you do happen to have more than you want, just take them to the village market, and see how readily you can sell the surplus. Perhaps, indeed, you may thus establish quite a profitable local trade in this delicious crop. Try it.

Poles for Beans and Other Climbers.—White birches and alders so commonly used for bean poles, are about the poorest, for they last only one season at the best, and sometimes break off at the surface of the ground, and let down the beautiful pyramid of green before the pods are ripe. White cedar from the swamps is durable, and the rough bark enables the vines to climb without any help from strings, but these are not always accessible. Red cedar is much more widely distributed, and on the whole makes the best bean pole. The wood is as durable as the white cedar, and young trees, from which poles are made, grow quite stout at the ground, and, if well set, will resist very strong winds. A set of these poles will last for a generation. For bean poles, all the side branches are trimmed off, but for a support for ornamental climbers, these may be left on. A cedar, six or eight feet high, with the branches gradually shortened from below, upwards, makes an excellent support for ornamental vines. One of these, covered with a clematis, or other showy climber, makes a pyramid of great beauty. It is well to prepare a supply of poles for beans and other plants before the work is pressing.

Beets.—For beets the soil should be rich, mellow and deep. Plant in drills about two inches deep and the rows about twelve or fifteen inches apart. Set the seeds in the drills about two inches apart. For field culture the rows should be wide enough to admit the horse cultivator and the roots not nearer than one foot in the rows. The mangel-wurzel beets grow to a very large size, are coarse and wonderfully productive, making excellent food for cattle. Those who have never tried the mangels for stock have yet to learn of their great value for cattle, both for milk and meat. Then, they are juicy and refreshing, and add to the health and comfort of the animals. In no way can so much good food be grown as cheaply as in mangels.

The Melon Worm.—The melon worm *(Phakellura hyalinatalis)* is about an inch and a quarter in length when mature, of a light yellowish-green color, and nearly translucent. The moth is remarkable for its beauty, its wings being pearly-white bordered with a narrow band of black, its legs and

body white, and the abdomen terminated with a feather-like tuft tipped with white and black. In our accompanying illustration, the chrysalis, worm, and moth are shown. This worm belongs to the same genus as the pickle worm *(Phakellura mitidalis)*, the moth of the latter differing from that of the former in having the ground-work of the wings a bronze-yellow, and the black border a little broader.

The melon worm is proving to be, in many parts of the country, a most destructive enemy to melons, cucumbers, pumpkins, and other cucurbitaceous plants. It goes to work in an exceedingly business-like way, making skeletons of the plant leaves or excavating numerous cavities in the fruit where it appears. Sometimes it forces its way into the melon until out of sight, though more frequently it makes a shallow cavity an eighth of an inch or more in depth, and in this pursues its work.

THE MELON WORM.

Efficient remedies for this pest are still wanting. Paris green and London purple would probably prove effective, but it is not safe to use these on account of their liability to poison those who eat the fruit. *Pyrethrum*, or Persian Insect Powder, might prove as effective in ridding the plants of the worms, and it has the advantage of being entirely harmless to human beings. Whatever poison is used, it should be applied to both foliage and fruit, inasmuch as the destruction of the former will prevent the latter from coming to maturity. Early planting, so that the fruit may be picked early, or before the destructive brood appears, is a preventive, and if the worms be destroyed on their first appearance on the foliage before the fruit begins to form, there will be much less danger to the fruit crop.

Insects on Garden Vegetables.—The most common of these are the caterpillars of medium-sized butterflies, the wings of which are white, with a few black spots; there are three distinct species, but all are similar in their habits. Wherever these butterflies are seen flitting about over the cabbage and cauliflower plants, trouble from "worms" may soon be ex-

pected. Safety consists in attacking them early. Some worms eat into the forming head, and when they have thus hidden, nothing can be done. In small gardens, hand-picking will answer, but where there are many cabbages, this is not practicable. The Persian Insect Powder, the *Pyrethrum*, is the best, and a safe application. There are in some localities cabbage worms which come from other butterflies, but they are to be treated in the same manner. The large green caterpillar, of the five-spotted Sphinx, known as the "Tomato Worm," is most destructive; it will soon leave nothing but bare stems upon a tomato plant, eating the green fruit as well as the leaves. When the tomatoes are supported by some kind of a trellis, as they always should be in a garden, worms may be detected by the quantity of large pellets of droppings found upon the ground. Where these are seen, the worm should be sought for. Stems without leaves also indicate its presence. When not eating, it will be found close to the stems, on their underside, and as it is of nearly the same color, may escape notice. The "worms" are never very numerous, and hand-picking is the best way to deal with them. In spite of the horn at the tail-end, they can neither sting nor bite. Frequently one of these will be found with its body nearly covered with small egg-shaped white cocoons, often mistaken for eggs. Worms with these should not be destroyed, as they are too weak to do much damage, and the parasitic insect should have time to leave these cocoons, as they are our friends, and should be encouraged. The tomato-worm may sometimes be found on potatoes.—*American Agriculturist.*

Hot Water on the Garden.—Insecticides are in demand. The farmer's first interest is to gain an insecticide that is effective. The next important point is that it be sufficiently cheap in cost to permit of free use. Hot water some of the English gardeners accept as a cheap insecticide not sufficiently appreciated, and capable of more extended employment than is usually believed. Hot water judiciously applied has been found effective among American farmers for cabbage worms. In careful hands its application, after the cabbage heads begin to form, has not injured the plants, but has destroyed the bugs. Experiments with hot water on the aphis at Stoke Newington and reported in the English journals, made it appear that aphides perish immediately if immersed in water heated to 120 degrees Fahrenheit. In order to ascertain the degree of heat infested plants could endure in the dipping process, a number of herbaceous and soft-wooded plants were immersed in water heated to various degrees above 120. Fuchsias were unharmed at 140 degrees and injured at 150 degrees. Pelargoniums were unhurt up to 150 degrees, but the slightest rise above that figure killed the soft wood and young leaves. Ferns, heliotropes, petunias, begonias, mignonette and many other plants of soft texture were unhurt by being dipped in water at 140 degrees, but the slightest rise above that point proves detrimental. Roses grown in pots for market were kept clean by dipping in water at 120 degrees without injury to the plants and every aphis destroyed.

Gas Tar as a Remedy for Bugs.—A correspondent of the Chicago *Tribune* says: "For the last five years I have not lost a cucumber or a melon vine or a cabbage plant. Get a barrel with a few gallons of gas tar in it; pour water on the tar; always have it ready when needed, and, when the bugs appear, give them a liberal drink of the tar water from a garden sprinkler or otherwise, and, if the rain washes it off and they return, repeat the dose. It will also destroy the Colorado potato beetle, and frighten

the old long potato bug worse than a threshing with a brush. Five years ago this summer both kinds appeared on my late potatoes, and I watered with the tar water. The next day all Colorados that had not been protected from the sprinkler were dead, and the others, their name was legion, were all gone, and I have never seen one on the farm since. I am aware that many will look upon this with indifference, because it is so simple and cheap a remedy. Such should always feed their own and their neighbors' bugs, as they frequently do."

Remedy for the Green Fly.—A writer in the *Deutsche Zeitung* states that he last year had an opportunity of trying a remedy for destroying green fly and other insects which infest plants. It was not his own discovery, but he found it among other recipes in some provincial paper. The stems and leaves of the tomato are well boiled in water, and when the liquid is cold it is syringed over plants attacked by insects. It at once destroys black or green fly, caterpillars, etc.; and it leaves behind a peculiar odor, which prevents insects from coming again for a long time. The author states that he found this remedy more effectual than fumigating, washing, etc. Through neglect a house of camelias had become almost hopelessly infested with black lice, but two syringings with tomato plant decoction thoroughly cleansed them.

To Destroy Bugs on Vines.—To destroy bugs on squash and cucumber vines, dissolve a tablespoonful of saltpetre in a pailful of water; put one pint of this around each hill, shaping the earth so that it will not spread much, and the thing is done. Use more saltpetre if you can afford it—it is good for vegetable, but death to animal life. The bugs burrow in the earth at night and fail to rise in the morning. It is also good to kill the "grub" in peach trees—only use twice as much, say a quart to each tree. There was not a yellow or blistered leaf on twelve or fifteen trees to which it was applied last season. No danger of killing any vegetable with it—a concentrated solution applied to beans makes them grow wonderfully.

Protecting Young Plants.—The striped bug is very destructive to young plants, especially of vines. It is almost impossible to get a stand of early cucumbers, on account of this pest. A writer in one of our exchanges states that a good protection is secured by cutting a sheet of cotton wadding into nine equal pieces, and then spliting them, making eighteen, at a cost for all of only four cents. These are placed over the hills before the plants are up, the corners held down with small stones. They are elastic and stretch as the plants grow. The bug cannot get through them. They are also some protection against frost.

A Valuable Mixture.—A valuable mixture to keep on hand is one of coal ashes, sulphur and hellebore. The ashes should be very fine. It is best after passing them through the ordinary coal-ash sieve. To one pailful of ashes thus sifted, add a quart each of flour of sulphur and hellebore, and mix together. For currant worms, plant lice, cabbage fleas, slugs on pear trees, melon bugs, we found this so effectual that we confidently recommend it. It is always best to use it in the cool of the morning while the dew is upon the leaf.

To Get Rid of Grubs.—The carrot crop is rendered useless in many gardens by grubs eating into the roots. This takes place in many well-managed gardens. The best remedy is to scatter a quantity of soot and lime

over the surface of the ground before forking it over for the carrots. This works it into the ground, and keeps the soil free from all sorts of grubs for the whole season. The next best way is to sow the lime and soot between the rows and hoe it into the ground.

Coal Ash Walks for the Garden.—Good, sound, dry walks are a necessity in all garden grounds, in order that the work in them may be carried on with comfort during all weathers, and although there is nothing like good gravel for walks in pleasure grounds, it frequently happens that, from the difficulty of getting gravel in quantity within a reasonable distance, the kitchen garden walks have to be made of what is most abundant. After trying all sorts of materials in different counties, it was found that nothing makes a better path than ashes. The way in which we use them is to form grass verges one foot wide and about one foot deep. In the bottom of the walk are put brickbats, stones, or other rubbish. On these a good layer of clinkers is spread, and broken down tolerably fine, when a good coating of ashes is spread evenly over the surface, and rolled down. These form one of the pleasantest paths on which to walk, wheel, or cart that it is possible to have. Weeds are not troublesome, for the material has been cleaned by passing through the furnace, and if a few seeds blow on to the surface and germinate they can be easily removed.

Club Root in Cabbage.—M. Waronin, an authoritative microscopic botanist of Europe, who has given particular attention to destructive insects, and especially to those predatory in the cabbage, finds that the abnormal growth on the roots, which he denominates club root, but which is known in the United States as club foot, is caused by a minute fungus, to which he has given the name of *Plasmodiophora brassicæ*. Thin sections of the diseased portions reveal the fungus with its spores, under the higher powers of the microscope. As the spores are exceedingly numerous, the soil becomes infested with them, and communicates the trouble to plants upon the same soil next year. A diseased crop should not be followed by cabbage again. Only healthy plants should be set. An application of lime to the soil has proved of benefit, and from the nature of the trouble, he thinks, the use of sulphur would be useful.

Soil for Sugar Beets.—The beet requires a deep, permeable soil, for its roots penetrate deeply into the ground and are abundantly supplied with fine fibers through which it receives its nourishment. If the soil does not permit the root to grow down deeply the top will be forced to grow above the ground, and the crown which grows out of ground is nearly worthless for sugar purposes. A deep, sandy loam is the best soil to produce beets rich in sugar. They will, however, grow on a variety of soils, and any soil which will plow and subsoil to the depth of twelve or fifteen inches is a good beet soil. Avoid all wet lands and muck bottoms as unsuitable. Beets will not flourish on wet lands, and what grow are not sweet. Muck bottoms produce large tops but small roots with little sugar in them.

Sulphur and Tobacco.—A mixture of sulphur and finely ground tobacco, two parts of the former to one of the latter, has been found an excellent preventive of the ravages of insects on squash and other vines, as well as for keeping lice from cattle, dogs and poultry. It is also recommended for sprinkling trees and bushes that are eaten by canker worms or currant worms.

Cultivation of Tobacco.—To raise tobacco, select a sheltered situation, where the young plants can receive the full force of the sun; burn over the surface of the ground early in spring (new land is best), rake it well, and sow the seeds; have a dry, mellow, rich soil, and after a shower, when the plants have got leaves the size of a quarter-dollar, transplant as you would cabbage plants, three and one-half feet apart, and weed out carefully afterward. Break off the suckers from the foot-stalks, as they appear; also the tops of the plants when they are well advanced, say about three feet high, except those designed for seed, which should be the largest and best plants. The ripeness of tobacco is known by small dusky spots appearing on the leaves. The plants should then be cut near the roots, on the morning of a day of sunshine, and should lie singly to wither. When sufficiently withered, gather them carefully together, and hang them up under cover to cure and prepare for market.

Starting Plants Early.—A writer on gardening gives the following hints on starting tender seeds, such as tomatoes, squashes, melons, and the like: "It is desirable in transplanting not to check the growth by disturbing the roots. A good way to avoid this is to scrape out turnips, fill them with good soil and plant in two or three seeds, setting them in a warm, light place, and keeping them moist. When the weather is suitable, place these out in the garden at the proper depth. The turnip will decay and the plant will thrive unchecked if properly cared for. Do not use potatoes instead of turnips. Another method is to get squares of sod, say six inches wide, from good, mellow soil, turn them bottom up, and put such seeds as squash, melon or sweet corn, and treat them in the same way, not putting out till the weather is quite warm, and then protecting against bugs. For more delicate plants, flowers, etc., make little square paper boxes out of thin writing paper, or thick newspaper, merely folding them at the corners as you would the paper in covering a book, and tacking them with a needle and thread; make them about three inches square and two deep. Fill with good soil; start the seeds and put them out at the proper time, boxes and all, without disturbing the roots. If you fear the paper is too strong for the roots to penetrate, cut carefully on the bottom of the box the shape of a cross, and all will be well."

Seeds for Small Gardens.—People who grow largely for market know, as a part of their business, how many garden seeds to sow, but this is not always the case with the man or woman who has but a small garden. For these we give the following: Asparagus, bed of 15 square yards, 1 pint. Beet, row 50 feet, 2 ounces. Cabbage, bed of 8 square yards, 1 ounce. Carrots, drill of 120 feet, 2 ounces. Carrots, bed of 12 square yards, 2 ounces. Celery, 4 square yards, 1 ounce. Endive, 4 square yards, 1 ounce. Bush beans, row 80 feet, 1 pint. Leek, 2 square yards, 1 ounce. Lettuce, 4 square yards, 1 ounce. Onions, 9 square yards, 2 ounces. Parsley, row 80 feet, one and a half ounces. Parsnip, drill of 200 feet, 2 ounces. Peas, early, row 60 feet, one and a half pints. Peas, large, late, row 80 feet, one and a half pints. Potatoes, row 30 feet, half peck. Radishes, 4 square yards, one and a half ounces. Spinach, 10 square yards, 2 ounces. Spinach, drill of 120 feet, 2 ounces. Turnip, 4 square yards, 1 ounce.

Asparagus as a Lawn Plant.—A friend suggests a very good idea as to asparagus: "Of course the old plan of sticking the plants in close beds is all wrong. There are many bits of fine soil in gardens, even the so-called

pleasure grounds and hardy plant borders, where a strong clump of the common asparagus would be a great ornament, as well as of use. I shall plant a hundred or more good clumps of asparagus in our borders here, partly for its tender shoots in spring, partly for its spray for cutting during the summer and autumn months, but mainly for its feathery grace as a beautiful, hardy plant. In many a villa garden, even where good asparagus may never be seen raised in the ordinary way, a capital supply could be obtained by simply dotting a few plants here and there in borders, and on the margins of shrubberies, not only as single specimens, but as groups and masses—never, however, nearer to each other than four feet."

Training Tomatoes.—A housewife, who vouches for the success of her plan, makes these suggestions for tomato training: "When the plants are ready for the garden, make a considerable hill of good compost. Chip manure is excellent, and a quantity of chicken manure is good. After the hill is made, drive a long stake through it. This may be six feet high. Set the plant near it. The training will require attention. The plant will immediately begin to sucker, or throw outside shoots, just above each leaf. These must be cut off, and then the plant will run up vigorously. Tie it to the stake, and do not be afraid to use the knife. Keep on cutting each stem that appears in the axil of a leaf, and keep on tying. The first bearing branches come directly from the body of the plant. Remember that this trimming must be continued as long as the plant bears. Thus trained, the fruit is superior in size, quantity, and flavor, besides being less liable to rot or drop off."

Bending Down Onions.—Many old truck farmers have caused surprise to lookers-on at their work, to see them bending over their onion tops. The time to do this is when some begin to show signs of flowering. The method is thus explained: "This operation may be done by the hand, but time is saved by two persons each holding one of the ends of a pole in such a manner as to strike the stems an inch or two above the bulbs. This is called 'laying over,' and is of great benefit to all crops of onions, as the growth of the stems is thereby much checked, and the whole nourishment thrown into the bulbs. It is an old practice in family gardens, and has never failed to give satisfactory results."

Early Cucumbers and Melons.—For early melons or cucumbers many plant the seeds on inverted sods cut about four inches square. The sods are placed in a frame of any kind, and covered to the depth of half an inch with mellow, rich earth. The plants root firmly in these sods the same as they would in small flower-pots, and may safely be transplanted as soon as the weather becomes settled and warm. For melons this is an excellent plan, since our seasons are scarcely long enough to ripen them before the cool nights of autumn, when the seeds are planted in the ground in the usual way.

Benefits of Hoeing.—Any one passing along where there are gardens can nearly always find evidences of the benefits of a constant stirring of the soil. The man who cultivates continually has always a better crop than has the one who is satisfied with a hard surface. The benefits from a loose soil are, in fact, so great as what many a load of manure gives. Those who have flower-beds know how much better plants grow when the ground is stirred. In the growing season all the rain that falls is needed by the crops, and a loose soil keeps the rain which the hard ground allows to run off.

New Ideas in Asparagus Culture.—Gardeners generally are beginning to adopt the practice of giving at least one yard distance between the plants in making new plantations of asparagus. They have found that the roots run horizontally, and not directly downward, and, therefore, that it is not advisable to continue the old practice of digging down two or three feet for a narrow bed, to be filled with manure mixed with soil, on which plants are to be set only a foot apart. Large shoots of asparagus an inch in diameter cannot be had by such treatment.

Substitute for Bean Poles.—A New England farmer says: "In my own gardening I have found a most satisfactory substitute for bean poles, which latter are not only expensive, but a source of trouble and care. I plant a sunflower seed by each hill of beans, the stock answering the same purpose as the ordinary bean pole, besides providing an excellent feed for my poultry. I have been using for this purpose a mammoth variety of sunflower seed, many of the flowers of which measured fifteen inches across the seed bed."

Potato Juice as an Insect Destroyer.—As an insect destroyer the juice of the potato plant is said to be of great value; the leaves and stems are well boiled in water, and when the liquid is cold it is sprinkled over plants attacked with insects, when it at once destroys caterpillars, black and green flies, gnats, and other enemies to vegetables, and in no way impairs the growth of the plants. A peculiar odor remains, and prevents insects from coming again for a long time.

To Force Radishes.—Radishes may be grown in a few days by the following method: Let some good radish seed soak in water for twenty-four hours, and then put them in a bag and expose to the sun. In the course of the day germination will commence. The seed must then be sown in a well-manured hot-bed, and watered from time to time in lukewarm water. By this treatment the radishes will, in a very short time, acquire quite a large bulk, and be very good to eat.

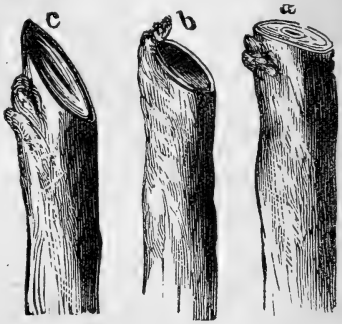
Culture of Sugar-Beets.—The best sugar-beet, when properly grown, should be conical, and with a single tap-root. To grow such beets the soil should be deep, mellow, free from stones, and abundantly rich. A deep, sandy loam, with plenty of vegetable matter, may be expected to produce, with clean culture, a profitable crop of sugar-beets. A strong clay is not suitable, neither is a soil that is low and naturally wet and cold.

Weeds on Gravel Walks.—Weeds on gravel walks may be destroyed and prevented from growing again by a copious dressing of the cheapest salt. This is a better method than hand-pulling, which disturbs the gravel and renders constant raking and rolling necessary. One application early in the season, and others as may be needed, while the weeds are small, will keep the walks clean and bright.

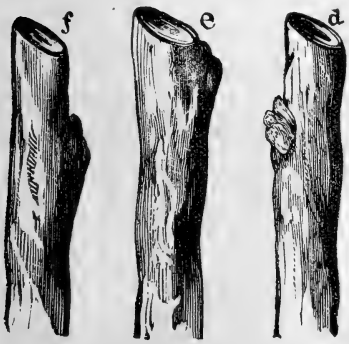
Water Necessary to Cauliflower.—A gentleman in Colorado informs us that by irrigation he grew cauliflower-heads four feet three inches in circumference. Cauliflower is fond of water, and we have seen large plantations on the continent of Europe that were regularly watered every evening except during rainy weather.

ORCHARD AND VINEYARD.

Pruning—Making the Cut.—In pruning branches from trees with the knife, the method of making the cut is a matter of some importance. We have had some illustrations made, showing several ways, often followed, which are wrong, and the one which is right; *a* shows the right method of making the cut, at an angle of about forty-five degrees, and having the bud at the back in the best position for throwing new bark and wood quickly over the wound; *b* shows too much of the wood cut away, leaving the bud exposed and liable to die by drying or freezing; *c*, this cut was started right, but, owing to a dull knife or want of firmness in the hand, the cut was made too sloping. This will not heal over so quickly as the cut at *a*; *d*, *e*, and *f* are all wrong; the wood above the bud dying will cause knots and perhaps decay. Crooked limbs will also result from these ways of cutting.



Pruning Deciduous Trees.—As a general rule, the less shade trees are pruned the better. Nature will form a better top and a more harmonious tree in all its parts than art. Severe pruning is no longer practiced, even in fruit orchards, by our best horticulturists. The custom that formerly prevailed of pruning evergreens and other trees, so as to make top-shaped, ovate, and other fantastic tops, is no longer regarded as good taste. If you want a tree with a low-spreading top, plant one that grows that way. If you want an ovate or pyramidal top, plant a tree that will make such a top, but do not attempt to force trees to assume different forms from those which nature gives them. Each tree treated in this way is a standing lie, and proclaims to every passer-by the folly of its owner.



The true idea is to make each species assume, as nearly as possible, the typical form of that species. To do this, some pruning is sometimes necessary. If the trees are not crowded—if each one has room enough for the air

and sunlight to have free access to it on all sides, it will round out and develop its full proportions, and if it does not actually attain it, will approximate its typical form. Where the lower limbs are in the way, of course they must be sacrificed; but where they are not, leave them, and you will have a finer and more thrifty tree. If a limb, as is often the case with the elm in our dry soil, extends beyond the rest, absorbing the strength and destroying the symmetry of the tree, it should be cut back while yet small.

The soft maple often throws out limbs that have no firm attachments to the body, and they will sooner or later split off; these should be removed while small. The idea of cutting back the top of a soft maple, or any other tree, to prevent it from becoming top heavy, is fallacious; it relieves for the time, but makes it worse afterward. If a soft maple, as some of them will do, breaks bodily, and continues to do so, it is better to remove it and plant another in its place. Severe pruning lowers the vitality of any ordinary tree, making it less able to bear the drouth and heat of summer and the cold of winter, and leaving it an easy prey to borers and other noxious insects.

As a strong man is able to resist disease, so a vigorous tree is able to resist the attacks of its enemies, while a feeble one succumbs.

So far as possible all limbs should be removed while small. It is rarely necessary to cut a large limb from a tree that has been properly cared for.

The Best Time to Prune Fruit Trees.—The correct principles which underlie the pruning of fruit trees are probably as imperfectly understood as any other point in fruit-growing. Most people prune in the spring, some through the winter, others in the summer. Now, after carefully observing the effects of pruning done at different seasons, I have come to the conclusion that the best time to prune is in early summer, after the first rush of sap is past, and before the trees have made much growth of new wood.

When trees are pruned in winter, a considerable time must elapse before the wounds made begin to heal over. During this time the combined action of the frost and sun are injurious to the newly-cut and exposed wood and bark, and it will take a longer time to heal over than if the wound was made at the time when the tree was beginning to make new growth.

When trees are pruned in early spring, the sap is then in a thin, watery state; it oozes out of the cut, causing premature decay and permanent injury to the tree.

When trees are pruned in early summer, after the rush of thin, watery sap is past and the tree has fairly commenced to make a new growth, the wounds will commence at once to heal over. The exposed wood will remain sound for a longer period than if cut in early spring.

Another very important point in early summer pruning is, it does not check the growth of the tree, as when it is done later in the season.

Some advocate pruning in July and August, but I would only prune then in cases where the tree was making too much wood growth, which I wanted to check and throw the tree into a bearing state.

Another very important point in pruning, and yet one which is very much neglected, is to cover the cuts with some substance to protect them from the influence of the weather. Common grafting wax, or a mixture of clay and cow manure, is beneficial; but perhaps the best thing, when it can be got pure and good, is gum shellac dissolved in alcohol to the consistency of paint. A protection of this kind is always beneficial to newly-pruned trees; it neutralizes to a great extent the injurious effects arising from pruning trees at an improper season.

Pruning Versus Mutilation.—There is, perhaps, no one item in horticulture about which so little is really understood as the principle which should govern in the pruning away of limbs and branches from trees The following illustration will serve, perhaps, better than a long homily, to show how we would prune a tree and keep it in condition from year to year, healthy and productive. Fig. 1 exhibits a tree which has had little or no pruning; its top branches have become rather crowded, and some seasons the fruit is not well colored. We take our long stepladder and a pair of good, strong pruning shears, set our ladder just outside, underneath the limbs, and with our sharp shears cut away the small spray and limbs that cross one another and crowd the extremities, so as to prevent the sun's rays penetrating to the center of the tree. The dark, short marks indicate some of the cuts that we should make in pruning the tree. Fig. 2, shown on next page, exhibits the tree as it is often found after the mutilator, not pruner, has operated upon it. Vandals roam the country every spring claiming to know how to prune trees. We hope what we have here said and illustrated may save at least one good orchard from this system of murderous pruning.

PRUNING.—FIG. 1.

Pruning for Fruit. — By arresting or removing the little faults of his children as soon as they are shown, the wise father prevents their attaining such inveteracy as will not submit to correction, but burst out immediately with fresh misdeeds. So with orchard trees. It is a great mistake to let growth run on without restraint for two or three years, and to suppose that a pruning then will set all to rights. The fundamental rule of the art is to take away all young shoots that are not fitted to make permanent bearing branches. Remove these, the sooner the better, but remove no others. Cut out and suppress all wild shoots that issue below the graft, and whose growth would rob or smother it. Cut out all shoots in the interior of the trees that will not have light enough in summer for the leaves of any fruit buds that might form on them, and which could, therefore, not mature into fruitage. Thin the new growth all over top so that no shoot will shade another or be shaded; those that are left being such as extend the main bearing branches, which gardeners call "leaders." Often a crowding branch can be propped or braced out into open light, and so two branches be relieved with little or no pruning of either, with a gain of large fruit-producing area. One other case must be noted: that of a tree exhausted so much as to be covered with fruit buds and making no new shoots. A tree in health should make new shoots every year all over the top, at least eight inches long. If it does less, the soil is poor, or the roots are robbed or dried, or the stem is injured and cannot carry the

sap, or the wood of the top has become unsound. The thing to be done then is to cut back the top, reducing it largely, to give the exhausted system less to do and more chance to recover. The vexed question of even and odd years, or fruitful and barren ones in alternation, which is so important to growers of Baldwins, Greenings, and some other winter sorts is solved most easily by a resolute thinning in the winter preceding the fruitful years, so as to reduce the bearing, and increase the wood and bud forming for the next year.

Pruning Peach Trees.—A fruit tree overloaded with fruit is very unsatisfactory to its owner. The fruit itself is of no more value than half the quantity of a better size. Then, too, the tree is often injured, so much so as to cause it to lose a year or two recovering. It is better to be satisfied with a small quantity of fruit, and this judicious pruning brings about. The *Prairie Farmer* advocates the following system of pruning peach trees: "The main branches of a young tree should be, early in spring, cut back to eighteen inches, being careful to leave on them any sub-branches near their base. The next spring the resulting, or next crop of branches, should be cut back in about the same way, and sub-branches half of them cut clear away, leaving every other one, and those not cut away cut back one-third or one-half. The summer after this the trees should give a splendid crop of fine fruit that will need no thinning. The after cutting back and pruning should be after the same general plan, thinning out and cutting back the upper and outer branches, but never thinning out the small branches near the base of the large branches, except as above. As the trees grow older it will be necessary to cut back and thin out more, year by year, and, eventually, it will be necessary to cut back half the main branches near their base at some point just above where a thrifty young twig is growing, so as to form a vigorous head."

PRUNING.—FIG. 2.

Necessary Precautions After Pruning.—After pruning the orchard, care should be taken to clean up and burn all the brush before the embryo insects harboring in it have time to mature. The loose bark should also be scraped off and burned, and every cluster of the eggs of the tent caterpillar be removed betimes and cast into the fire. Attention to these matters will save a great deal of vexation and loss.

Grafting Apple Trees.—Apple trees may be grafted in spring, any time after severe cold weather is past, until the leaves are fully formed. There are many different methods of grafting in vogue among nurserymen and orchardists, but for large trees in the orchard, what is called cleft grafting is the one usually practiced. In performing the operation, the main stem, if not more than an inch or two in diameter, or a branch, or any number of them on a large tree, is sawed off, and the portion remaining is split downward two inches or more with a large knife or chisel, being careful not to bruise or break the bark. Then a cion from a tree which we desire to propagate is cut, with two or three buds upon it, as shown in Fig. 1, the lower end being cut on each side, forming a long, slender wedge. The cleft in the stock may be held open with a small hard wood or iron wedge, driven in the center. When the cions are prepared, insert one on each side of the cleft, as is shown in Fig. 2, being careful to have the outside of the wood of both cion and stock exactly even, and then withdraw the wedge, and the stock will grasp and hold the cions firmly in place. The end of the stock and the side clefts should then be carefully covered with grafting wax, for the purpose of excluding air and water. To prevent the grafting wax sticking to the fingers of the operator, a little piece of tallow or other kind of grease may be applied to the hand and fingers each time, before taking hold of the wax.

FIG. 1.

FIG. 2.

When cions are to be taken from trees in the same orchard or neighborhood, they may be cut and inserted the same day, even if somewhat advanced in growth of buds; but, as a rule, the cions should be taken from the trees before the buds begin to swell in spring, and then put in a cool cellar and rolled in damp moss cloth, or buried in earth, where their growth will be retarded. Grafting trees is a very simple operation, and almost any boy who can whittle a stick can readily learn how to perform it successfully. Make a clean smooth cleft in the stock, and use a sharp knife in preparing the cion, and then see that the two join as we have directed, and there is lit-

tle danger of failure if the cions are healthy and in proper condition. Strong, firm one-year-old wood should be used for this purpose; that which is about one-quarter to three-quarters of an inch in diameter is the most suitable.

The apple, pear, plum, and cherry may be grafted in the manner we have described, and by almost any one who will try.

Grafting Wax.—There are a great many recipes given for making grafting wax, but the following is, in our opinion, the best: To four pounds of resin and one of beeswax add one pint of linseed oil; put in an iron pot, heat slowly, and mix well. Pour into cold water, and pull by hand until it assumes a light color; work into sticks, and put into a cool place until wanted. In using, oil the hands, work the wax until soft, and press it tightly around the graft and over the cracks. If the day be warm, it is better to occasionally moisten the hands with water.

TRANSPLANTING LARGE TREES.—FIG. 1.

Grafting the Wild Cherry.—The common black cherry regarded as "wild" can be grafted with other and best varieties as easily as cherries usually are. Many of these trees, which produce the poorest kind of fruit, can all be top grafted, and may be made to yield an abundance of excellent fruit. Only healthy trees should be selected for grafting, and the cions should be in the best condition.

Transplanting Large Trees.—Many and various are the reasons for transplanting large trees. Many persons desire to remove from the forest to their own grounds trees of twenty or more feet in height for farming, new ornamenting, screens, or shade. Trees of more than four inches in diameter should be removed with a ball of earth attached. This operation is easily and safely performed in two different ways, as the accompanying figures indicate. When the trees are to be removed long distances, the plan used in Fig. 1 should be adopted. First dig around and loosen the tree, care being taken not to injure the roots by digging too near the tree. Place the connecting pieces (M) of the standards (R R) against the tree, to which fasten by ropes winding cloths or matting about the tree, to prevent breaking the bark. One horse attached to the rope (B) will easily raise the tree and ball of earth and place it upon the stone boat or drag (P), upon which it may be transplanted long distances without injury. It may be removed from this vehicle to the hole prepared for its reception by the same process.

Another quite common method is to use the rear wheel and axle of a

farm wagon. Firmly secure on top of the center of axle a pole (S) twelve feet in length, the short end projecting from the axle two feet, to which is secured a short chain with hooks. Loosen the tree as before described; wind about the tree, close to the ground, matting or old carpet, pass around a small chain a number of times, into which catch in the hook, and by lowering the lever (S) to the ground the tree will assume the position shown in Fig. 2. The heavy ball of earth keeps the tree in an upright position, and one man holding the lever, and the other leading the horse, the tree is carried to the place for its reception, and there deposited by raising the lever.

Care of Trees After Transplanting.—Newly transplanted trees that are not starting properly should receive attention. The first suggestion is always to pour water on the surface. But little, if any, of this moisture ever reaches the roots, where it could be beneficial. Experience of late years has taught our tree planters that when the soil is firmly pressed, so as to come into immediate contact with all the roots, and of course stop all air passages among them, but little water after planting is needed. During an excessively dry spell, however, several deep holes may be made in the soil by means of an iron bar, and water poured in several times; but in ordinary seasons a liberal mulch over the surface will answer. The best restorative for a weakly tree after transplanting is to shade the bark, and this may be done by wrapping the body loosely with newspapers, allowing them to extend even to the main branches, if large. Moisture over the tops is quite as helpful as at the roots, so that a thorough syringing among the branches every evening until active growth sets in will answer an excellent purpose.

TRANSPLANTING LARGE TREES.—FIG. 2.

Points on Pear Culture.—The cultivation, until the trees have come into their second or third year of bearing, may consist in growing corn the first year, as it affords considerable protection to the young trees from the heat of the first summer. After this some hoed crop, like potatoes, peas or beans, may be grown; and it should be fertilized with well-rotted stable manure and thoroughly cultivated. This keeps the trees supplied with food and the soil loose and friable. Hot, violent manures should never be applied to an orchard, and especially to one of pears. Use an ordinary one-horse cultivator, and a good one-horse plow. A good workman will go deep enough with such a plow, and not injure the roots as he would with a large one. By all means be sure of the efficiency and carefulness of a man before admitting him into the orchard with a horse and cultivator or plow. The damage a poor man did in one of our orchards in less than half a day would not have been covered by two or three months of his wages. A five-year-

old pear tree in vigorous health is worth fully $10, and when a dozen such are injured the aggregate loss is quite an item. The horse should be a careful one, accustomed to such work.

Owing to other pressing duties, it occasionally happens that a heavy growth of fall grass is permitted in the orchard, after the vegetable crops do not longer need cultivation. It should not remain all winter, especially around the trees, as it affords snug retreats for rabbits, field mice, etc., which too frequently gnaw the bark of the young trees, sometimes completely girdling them, and causing death. To prevent this, in the late fall, with a hoe or strong iron rake, remove the grass from around each tree for two or three feet, and to make a further protection, ridge up around the trees with the plow, this ridge can be easily plowed or cultivated down in the spring to give a level surface to the orchard.

Planting hoed and well-manured crops between the trees supplies them with all the matter needed during the first few years. When the trees get too large to make it either desirable or profitable to grow such crops, manure in some form must be specially applied to make up the deficiency. Bone-dust makes a valuable dressing, as does well-rotted stable manure, which, no doubt, is the most easily obtainable on the farm. There is nothing which equals wood-ashes, and we attribute much of our success in raising heavy crops and splendid specimens of pears to the liberal use of this fertilizer. Not only did we use all that we could save on the place, but bought liberally at good prices. If enough cannot be secured to put over the whole surface spread the ashes around each tree. The best time to apply the manure is in late fall or early spring, after the plowing and before the harrowing. If there is an undue growth of wood and foliage diminish the supply of manure; and it is sometimes well to put the land down to clover (never to timothy, wheat, rye or other uncultivated grain), and let it remain one or two years in sod. It can then be plowed and planted with corn to break the sod, and the ground either used for vegetables or kept fallow.—*Agriculturist.*

Waste Bones for Trees and Vines.—The bones of fish, fowls, and the large and small pieces of bones which are purchased with beefsteak and mutton, constitute the very best food for fruit trees and grape vines, if the fragments are only placed where the roots can lay hold of them. Instead of allowing pieces of bones to be cast into the backyard, as food for stray dogs and cats, domestics should be directed to deposit everything of the sort in a small tub provided with a cover. As soon as a few pounds have accumulated, take the tub to some grape vine or fruit tree, dig a hole three or more feet long, a foot or two wide, and not less than a foot deep, into which the bones are dumped, spread over the bottom of the excavation, and covered with the soil. The more the fragments can be spread around, the better, but they should be buried so deep that a plow or spade will not reach them. The roots of growing vines or fruit trees will soon find the valuable mine of rich fertility, and will feed on the elements that will greatly promote the growth of healthy wood, and the development of fair and luscious fruit.

Many horticulturists and farmers purchase bone-dust costing not less than two cents a pound, simply to enrich the soil around and beneath their trees and vines. Fragments of bones are just as valuable as ground bone, although their elements of fertility will not be found available in so short a time as if the large pieces were reduced to atoms. Nevertheless, if large bones be buried three or four feet from a grape vine, the countless numbers

of mouths at the ends of roots will soon dissolve, take up, and appropriate every particle. When cast out of the kitchen door, bones are a nuisance; whereas, if properly buried, they become a source of valuable fertility. Let every person who owns a grape vine or fruit tree save all the bones that pass through the kitchen, and bury them where they will be turned to some profit.

Orchard Management.—In three years, says a writer, I improved the production of my fruit trees from fifteen to two hundred bushels, by treating them in the following manner: I first reduced the top one-fourth, then in the fall I plowed the soil as well as I could, it being quite rocky, and turned a short furrow toward the tree. As I worked from them I let the plow fall a little lower, and when between the trees I allowed the plow to run deep, so that the water would settle away from them in the spring. I hauled a fair quantity of coarse manure, pulverized it well, and marked out the hills, measuring each hill. I planted corn and beans, and harvested a nice crop of corn, beans, and pumpkins. The following spring I repeated the same form of cultivation, and harvested the second crop of corn, beans, and pumpkins, which paid me to satisfaction. My trees began to grow very fast; and that fall I harvested seventy bushels of very good apples. The following spring I manured for the third time, planted it to potatoes, which grew very large, but rotted very badly. I made up the loss, however, by harvesting 200 bushels of large and natural fruit. I changed the production of a yellow bellflower tree from three-fourths of a bushel to seven bushels, and sold them for $1.25 per barrel, which I think a very good return for my labor. From my experience I am of the opinion that most trees have too much top for the amount of roots and a deficiency of nourishment for producing a developed fruit. I like fall or winter pruning. Always cover the cut with grafting wax or a thick paint. After removing the limbs by thinning out the center of the tree, it has a tendency to make it grow broad. Too many varieties are bad, and hardy stock is all that is needed.

The Roots of Fruit Trees.—While fruit growers are aware now that the roots of trees and plants extend to a great distance, still it is difficult to break away from the old habit of manuring about the trunks, trusting that somehow or other the fertilizer will be appropriated, and fearing that if spread broadcast it may some way become lost. It will be found difficult to place manure in an orchard or vineyard where the plants will not reach it, and if properly spread it will not be lost. Should it sink into the subsoil the roots will follow it and bring it back by the ear, as a teacher would a truant school-boy. We have observed the roots of apple trees in sand pits extending downwards ten feet. We recently followed the roots of an old grape vine twenty feet under the location of a defunct building. When we stopped digging, the roots were as large as a little finger, were four feet beneath the surface, and probably extended ten feet farther. A pile of manure about the base of this vine would have done but little good. Knowing the extent and habit of root growth, it is apparent that cultivation close about the trunks of the trees or vines is not necessary; and is often productive of more harm than good in marring and breaking, besides tempting profanity on the part of the plowman.

How to Fertilize Fruit Trees.—Here and there on all farms and in most fruit gardens will be seen an occasional tree or grape vine which seems to lack vigor—does not grow well, and yet seems to have no particular dis-

ease. The probabilities are that the tree is dying of starvation and needs a liberal supply of food. When you give it this ration do not pile a load of manure around the trunk of the tree or the body of a grape vine. That is just the place where it will do the least good. Nearest the trunk of the tree the roots are all large; the fibrous roots—the feeders—are farther off, near the ends of the roots. These only can take up the nutriment. It is always safe to assume that the roots extend as far from the trunk in every direction as do the limbs of the trees, and to properly fertilize, spread the manure all over that area. Then fork it in, and you have done a good work and done it well. If some disease has begun its work on the tree, you will put the tree in a healthy, vigorous condition, the better enabling it to successfully contend against its enemies. We have seen numerous old pear and apple trees, bearing poor and gnarled fruit, which the owners consider of no value, which such treatment as we have outlined above would restore to their original usefulness.

A Belgian Fruit Gatherer.—We illustrate a novel little invention for gathering fruit as used by the Belgians. It is made as follows: Take a pole ten or twelve feet long, and on top of this attach a thin disk, as shown by the illustration, about six inches in diameter, set with wooden teeth, just like the teeth of a hayrake. Carefully placing this under a pear so that the pear rests on the disk, and giving a slight twist, it will at once detach and bring down the fruit without marring or injuring it in any way.

BELGIAN FRUIT GATHERER.

How to Renew an Orchard.—We would plow the orchard in the fall, and then either cross-plow it in the spring or cultivate it thoroughly, according to its condition. Thorough working the ground will help the orchard and also the crop. It should be plowed shallow, especially under the trees, and care should be taken not to break off or mutilate the roots. Much damage is done to orchards by careless plowing. Corn is the best hoed crop for an orchard, and beans the next best. Potatoes should never be planted in an orchard, as they exhaust the potash from the soil, and this is just what the apple trees require. Barley, or spring rye, is the best adapted to be sown for the seeding. Under the apple trees the grain should be thinly scattered, for much seed would only be wasted on account of the shade, but the grass seed should be put on thickly. The least exhaustive crop should always be grown in an orchard, or else the trees will be robbed of needed sustenance; hence it is always best to pasture the ground rather than mow it: nothing will run an orchard down so fast as to make it a meadow, as it is a double robbery. The ground may be plowed in the spring, but for an orchard, we would prefer turning it over in the early autumn, in order that the trees may have the full benefit of the decayed sod and the more mellow soil.

Errors in Fruit Tree Culture.—Deep planting is one error—to plant a tree rather shallower than it formerly stood is really the right way, while many plant a tree as they would a post. Roots are of two kinds—the young and tender rootlets, composed entirely of cells, the feeders of the trees, always found near the surface getting air and moisture; and roots of over one year old, which serve only as supporters of the trees, and as conductors

of its food. Hence the injury that ensues when the delicate rootlets are so deeply buried in earth. Placing fresh or green manure in contact with the young roots is another great error; the place to put manure is on the surface, where the elements disintegrate, dissolve, and carry it downward. Numerous forms of fungi are generated and reproduced by the application of such manures directly to the roots, and they immediately attack the tree. It is very well to enrich the soil at transplanting the tree, but the manure, if it be in contact with or very near the roots, should be thoroughly decomposed.

Fruit Tree Culture.—A writer in the *Western Agriculturist* gives these rules, which are of wide application: 1. Instead of "trimming up" trees according to the old fashion, to make them long-legged and long-armed, trim them down, so as to make them even, snug and symmetrical. 2. Instead of manuring heavily in a small circle at the foot of the tree, spread the manure, if needed at all, broadcast over the whole surface. 3. Instead of spading a small circle about the stem, cultivate the whole surface broadcast. 4. Prefer a well pulverized, clean surface in an orchard, with a moderately rich soil, to heavy manuring and a surface covered with a hard crust and weeds and grass. 5. Remember that it is better to set out ten trees with all the necessary care to make them live and flourish, than to set out a hundred trees, and have them all die from carelessness. 6. Remember that tobacco is a poison, and will kill insects rapidly if properly applied to them, and is one of the best drugs for freeing fruit trees rapidly of small vermin.

Protection of Trees.—Mr. A. M. Daniels, in an address before the Chenango County Farmers' Club, in relation to the protection of trees, stated as the result of his observation that, "when the fruit is stimulated to rapid growth by an abundance of juices in the tree, it is affected by the hot sun and drying wind. In the disease called the frozen sap blight, so disastrous to young orchards when it affects the trunk, the tree dies. This occurs more frequently after severe winters, by inactive or arrested circulation. Young orchards should be protected from the hot sun or cold of winter by the use of straw, cloth, or board boxes. The scorching rays of the sun should never be allowed to come on the body of a tree, and Nature by the foliage provides against it. No fruit tree can stand freezing and thawing in spring without being injured by it. The great object to be attained in raising a young orchard is ripened and mature growth. When that is attained we are on the road to success. Late growth should not be stimulated."

Fruit Cellars.—Fruit cellars need careful oversight; for the late sorts to come to proper perfection, and to keep well, they must be in a temperature as low as may be without freezing; it must not be forgotten that fruit in ripening gives off heat, and this must be regulated by the admission of cold air from without. In ripening, a considerable amount of carbonic acid is given off, which would be of use in retarding the ripening, but very dangerous if allowed to accumulate in the cellar of a dwelling, hence ventilation by means of a chimney, or in some other manner, is a matter that must be attended to.

Thinning Fruit.—An orchardist who makes his trees bear a moderate crop every year, of larger and finer fruit than when crowded, gives the following directions for doing the work: A light ladder is used to give ready access to any part of the tree. The branch is held in the left hand, while

with sheep shears in the right, every bunch of apples is cut off, leaving a part of the stem of each fruit. This is done as soon as the blossoms have fallen, and before the young fruit has attained any size. When this branch is entirely cleaned, the next branch is skipped, and the third cleaned of the fruit like the first, and so on until every alternate branch is divested of its fruit. This work is not done on the small limbs here and there over the tree, but on main branches, and equally on both sides of the tree. Of medium-sized trees, an active man will go over fifteen or twenty in a day.

Destroying the Plum Curculio.—A great deal of useless advice has been given out concerning easy methods of destroying the plum and peach curculio. In most parts of the country it is impossible to raise plums unless one exercises a daily warfare against the insects. Persons who have two or three plum trees about the yard should succeed in raising fruit enough for their own use, but this they are seldom able to accomplish. The less trees one has, the greater will be the proportionate number of insects to attack them.

Such methods as burning coal tar under the trees, hanging cobs, saturated with molasses, among the limbs, are usually of no avail in saving a crop of plums or peaches. The only sure method is persistent catching. The curculios spend their nights near the base of the tree, under chips and barks. Early in the morning they ascend the trees, to lay their eggs in the young fruit.

There are two modes of catching them. The one devised by Mr. Ransom, of Benton Harbor, Mich., is to nicely smooth the earth about the base of the trees, and to lay a few small blocks of wood or chips on the surface. The beetles crawl under these for shelter, and can be taken very early in the morning before they ascend the trees. The chips should be examined as soon as one can see in the morning. This is the method most practiced in the extensive peach belt of Michigan.

The other method is to spread a large sheet under the tree, and jar the beetles off on to it by means of one or two quick blows with a long-handled mallet or bumper. Each of the large branches should be struck, and the mallet should be wound with cloth to prevent injury to the trees. This practice should be followed early in the morning also, as when the days get warm the beetles are too lively to be caught. Many of the best peach and plum growers practice both these methods. In the case of a few trees about a yard both should be used, and there will be little doubt as to a good reward in fruit. The practice should be followed up every morning for a couple of weeks after the blossoms fall, and at wider intervals until the insects disappear. A sheet may be stretched over a large wooden frame for convenience in handling.

A Suggestion to Growers of Plums.—If you want a good crop of plums or damsons, as soon as your trees are out of blossom, and the fruit formed, keep a hen with a brood of young chickens tied beneath the tree, and give her a range as wide as the boughs of the tree, and she and her brood will destroy every curculio, and reward your care and forethought with a crop of luscious plums. Keep the chickens there until the fruit be half or more than half grown.

Manure for Fruit Trees.—It is best to abstain from the use of stimulating animal manures, unless decomposed, and previously composted with mellow soil. Nothing is better than wood ashes to induce a sound, healthy

growth and good yield. The scrapings of the wood pile mixed with ashes, decayed leaves, and road washings, are all of value as manures. Salt sprinkled around the trees, or applied in the form of brine, is frequently beneficial, especially where the fruit falls before ripening.

Maxims for Fruit Growers.—All fruit trees like a rather dry, rich soil. On a cold clayey bottom diseases are usually frequent. Do not plant deep; cut off tap roots, and encourage surface fibres. Surface manuring is the best mode of doing this after the tree is planted. Do not allow anything to grow vigorously around your trees the first year of planting, nor allow the soil to become hard or dry.

Insects Injurious to Fruit Trees.—To keep the insects from the trees requires the closest observance, and, soon as found, destruction must commence. Their habits should be learned as much as possible. When the insects are in the winged state is the time they lay their eggs. They multiply with astonishing rapidity, one insect often hatching thousands in a single season. June is the time most of the insects lay their eggs, and at that time bonfires should be built at night, when the insects will fly into them and be destroyed; or, if you have only a few trees in the garden, get some bottles with wide mouths, and fill half full with a mixture of water, molasses, and vinegar, and tie up in the trees; empty in a week, and fill again. And at that time (June) the bark should be washed with soft soap, the trunk and the limbs as far as can be reached; also sprinkle a handful of coarse salt around the roots of the tree—we have found it valuable. Put coal ashes, about a peck, around the base of each tree, as it not only drives away the grubs, but acts as a fertilizer. The best way to kill insects on the tree is to dust air-slaked lime over it when the dew is on the tree; or, steep tobacco stems in boiling water, and, when cool, syringe the tree.

Birds are of great value in destroying insects, and they should have the best of care given them, to encourage their building and living on the place, especially our common sparrow (not the English sparrow), wrens, bluebirds, robins, quails, etc. Don't allow them to be frightened or shot at, and they will pay well.

Toads and bats destroy a great many insects in the spring. As the green fruit drops it should be gathered up and fed to the hogs, for it contains a worm which burrows in the ground. Where small quantities of trees are grown, as in the garden, it is a good plan to fence in the trees, and let the hogs or chickens eat the green, wormy fruit as it falls; we have known plum trees to bear enormous and paying crops when treated in this way.

Pear Blight and Peach Yellows.—Pear blight and peach yellows are subjects of prolific and dissenting discussion at every horticultural meeting. Mr. Satterthwait, in a report on the diseases of fruit trees to the Pennsylvania State Horticultural Society, points out the great difference between the two diseases; namely, that while the yellows is extremely contagious, no one need fear to plant a pear tree where a blighted one has been removed. He stated that he had thousands of trees, vigorous and entirely healthy, that were planted beside the stumps of trees killed by the pear blight, and not one was ever affected. He regards it as proved to a certainty that pear blight is an entirely different disease in its nature from the peach yellows, and he mentioned, as additional proof, that it is a usual occurrence for pear trees to be locally affected, or in a single branch, without the disease spreading, and the tree entirely recovering its health and vigor.

Mr. Satterthwait reported favorably of the Kieffer pear, about which opinions are so variable With him it has proven not only wonderfully productive, but handsome in appearance and gaining high prices in market. He believes the quality of this much-disputed pear depends largely on properly ripening the fruit. His plan consists in packing the pears in wooden boxes, containing about one bushel each, and placing them in a cool, dry cellar, one on top of the other. In this connection it may be well to state that C. M. Hovey, of Boston, is credited with saying that the Kieffer is the least satisfactory of all his eight hundred varieties of the pear—another indication that the Kieffer gives different results in different localities under varying circumstances.

Tomato Leaves a Remedy for the Curculio.—"I planted a peach orchard," writes M. Story, of the Society of Horticulture of France, "and the trees grew well and strongly. They just commenced to bud when they were invaded by the curculio (pulyon), which insects were followed, as frequently happens, by ants. Having cut some tomatoes, the idea occurred to me that, by placing some of the leaves around the trunk and branches of the peach trees, I might preserve them from the rays of the sun, which are very powerful. My surprise was great, upon the following day, to find the trees entirely free from their enemies, not one remaining, except here and there where a curled leaf prevented the tomato from exercising its influence. These leaves I carefully unrolled, placing upon them fresh ones from the tomato vine, with the result of banishing the last insect and enabling the trees to grow with luxuriance. Wishing to carry still further my experiment, I steeped in water some leaves of the tomato, and sprinkled with this infusion other plants, roses, and oranges. In two days these were also free from the innumerable insects which covered them, and I felt sure that, had I used the same means with my melon patch, I should have met with the same result. I therefore deem it a duty I owe to the Society of Horticulture to make known this singular and useful property of the tomato leaves, which I discovered by the merest accident."

The Codling Moth and Other Enemies of the Apple.—This old enemy of the farmer is now getting in his work upon the growing apples. Where an orchard is infested with them, we know of no reliable method of getting rid of them and saving the crop. The curculio, which is so destructive to the plum crop, is of late quite as damaging to the apples, in some sections doing much more harm than the former; and there is still another pest which is working a terrible harm to the crop—the apple maggot *(Tryp-peta Pomonella)*. This burrows in the apple, often several maggots being found in the same apple. The eggs are laid by a small fly, somewhat resembling the common house-fly, but much smaller, through a small opening in the skin, made with its ovipositor.

The best guard against these pests is for every farmer who has an orchard to keep sheep or swine running in it all the season through. These will eat up every infected apple and thus destroy the larvæ, which, if left unmolested, will bring forth a crop of pests for next year's crop. If every one would do this, it is safe to assume that the ravages of these pests would be materially decreased.

Diseased Cherry Trees.—Many of our neighbors' cherry trees are becoming knotty, and dying, writes a correspondent of *The Rural New Yorker*. A lady narrated in our hearing, a few evenings since, her experience with a

tree of the same description. A large tree, of the common red variety, stood by the kitchen door. The body and limbs were knotty and rough, the fruit scanty and worthless; the dead leaves in fall were continually drifting over the porch and walk; in fact, in the good housewife's eyes, the tree was simply a nuisance, and she importuned her husband to remove it. He refused to do this, however, and she determined to kill the tree. First, a barrel of beef brine was poured about the roots, and this was followed by boiling suds, every wash day. The result was satisfactory, but far from that anticipated. The following season the tree was loaded with superior fruit, and was free from all knots and other defects. The enormous crop and changed appearance of the tree might not have been attributable to the application of brine and soap-suds, yet we believe the experiment to be worthy of trial.

Kerosene as an Insect Destroyer.—Kerosene is a cheap and effective insecticide where it can be applied without injury to the growing tree or plant, but to what extent it can be safely used has not been fully determined, the results obtained not being uniform. Spraying kerosene upon the leaves of cotton killed the plant. The bark of elm-trees, around which bands of felt saturated with kerosene had been applied, was destroyed wherever the oil reached it. The trunks of orange-trees which had been wet with kerosene to destroy scale insects were denuded of the greater part of the bark to which the oil had been applied. On the other hand, a bark louse, which was very abundant upon some ivy, was destroyed by the application of pure kerosene, with no apparent bad results to the vine.

Protection Against Pear Blight.—The *Gardener's Monthly* gives a statement from G. R. Dykeman, of Shippensburg, Pa., of his experiments in applying oil to the trunks of fruit trees—a practice which has been strongly recommended for its beneficial effects, among other things as a protection against pear blight. Mr. D. applied oil last year to 600 peach trees, 200 apple, several pear and plum trees, and 100 quince. All the peach trees, five years planted, were killed; the other trees were not injured. Other peach trees were painted with refuse lard and linseed oil, and these are all dead. The object in greasing was to keep the rabbits off. Oil is sometimes applied for the white scale.

Injuries to Trees.—Injuries to trees should be repaired as soon as discovered. Limbs broken by snow and ice must be sawed off to make a smooth wound, and this covered with paint, varnish, or wax. Barking by mice or rabbits often looks more serious than it really is. The majority of cases will recover if the wound is protected by a thick poultice of cow-dung and clayey loam, bound on with a piece of coarse material. In very severe cases the tree may be saved by connecting the bark above and below the wound, by means of twigs of the same tree; the ends are chamfered, and inserted under the bark above and below, to bridge over the wound, covering the exposed parts with grafting wax.

Protection Against the Plum Curculio.—A fruit grower states that he kept a plum tree from curculios by sprinkling the ground under the tree with corn meal. This induced the chickens to scratch and search. The meal was strewn every morning from the time the trees blossomed until the fruit was large enough to be out of danger. The consequence was that the fowls picked up the curculios with the meal, and the tree, being saved from the presence of the insect, was wonderfully fruitful.

Suggestions to Fruit Growers.—I find that lime, wood ashes and old iron put around the roots of declining fruit trees have a very beneficial effect, writes a fruit grower of many years' experience. These fertilizers restore the tree to a healthy condition, and also greatly improve the fruit in quality and quantity. I made the application on a Windsap and Never Fail, about half a bushel of mixed lime and ashes to each, and dug it in with a hoe some six feet around the trunk, and put the old iron immediately around the base of each.

The trees put forth with renewed vigor, bloomed abundantly, and yielded a good crop of fruit. An excellent wash for trees may be made thus: Heat an ounce of salsoda to redness in an iron pot, and dissolve it in one gallon of water, and while warm apply it to the trunk. After one application the moss and old bark will drop off and the trunk will be quite smooth. The wash has highly recuperative properties, making old trees bear anew.

I have tried soft soap as a wash with good results, and also a coating of lime in the spring season, which is a fine specific for old trees. The question is often asked, is it best to manure trees in the fall or spring? I have found the summer season to be a good time; I have much faith in mulching, especially young trees, for several seasons after they are planted. Apple trees are said to have two growths during the season—the secondary growth takes place after midsummer, hence it is that a top-dressing of good manure, and also coarse litter, facilitates the late growth, and often produces very marked results in the habit and formation of the tree.

The good effect that mulching has to young trees is, that it wards off the intense heat of the sun from the tender roots, and also has a tendency to hold moisture. A good top-dressing of stable manure in the fall, around young trees, with a good many corn cobs cast over the surface of the soil, give satisfactory results.

Ants on Young Trees.—An authority says that ants do not destroy trees. The ants are after the lice which are hurting the trees. These lice exude a sweet substance which attracts the ants, and the ants do no harm. To get rid of the lice make a solution of whale-oil soap, and add to a pailful one drachm of carbolic acid. Syringe or spray this on the under side of the leaves and it will either kill or drive away the lice, and the ants will be seen no more.

Diseased Peach Trees.—The following is said to be a sure remedy for the yellows in peach trees: "One part of saltpetre to two of salt, placed close to the body of a tree before a rain. It seems not only to destroy any fungoid growth of vermin which may be infesting the roots, but to act as an excellent fertilizer."

Suggestion Regarding Apple Trees.—It is a good idea to wrap the trunks of apple trees with burlap sacks, and to examine the wrappings every few days, or at least every week, to ascertain if any of the grubs or worms of the codling moth have found their way into them, that they may be destroyed.

The Peach Borer.—A fruit-grower placed tobacco-stems around the trunks of peach trees, and there is not the slightest sign of a borer in any of the trees so treated. He set the stems around the butts of the trees, and tied them at the top. It keeps off rabbits as well in winter.

Fruit Growing Jottings.—"Line upon line, precept upon precept," says a Southern fruit grower, must be written regarding the proper manner of planting out fruit trees; not that there exists a great diversity of opinion, but because so little heed is paid to the plain teachings of nature and common sense. "The way father or grandfather did it" is authority for the majority, and they seek no further knowledge.

Now the world moves, and many new and valuable methods have been devised which insure the desired kind and quality of fruit, hasten maturity and prevent decay. The non-progressive orchardist sells his fruit for a nominal figure, whenever he has any to sell, which is not often, and is continually complaining because his orchard "doesn't pay." It *does* pay for all the labor bestowed upon it, but it will not pay for what it does not receive.

Any kind of a fruit tree is an enormous feeder if it produces any amount of fruit. Who can reasonably expect to receive barrel upon barrel from any given tree, year after year, when nothing is fed to it? As well might the owner expect to work a week on the memory of a Sunday dinner.

Trees should be fed, therefore, and liberally, too, if large crops of fine fruit are expected from them.

The old-fashioned way of crowding trees in the space devoted to orchard purposes is still persisted in, notwithstanding the teachings of nature to the contrary. Trees are crowded in the rows like lodgers in a tenement house, and the results are as disastrous in one case as in the other. Trees, like human beings, need air and light. They *must* have these, or their lives do not reach three score years and ten. Fruit *will not* grow in the shade, and it is beyond the power of any man to cause it to do so.

'Tis true, when trees are young, a proper space seems unreasonably large—there seems to be a waste, but there really is none. It is questionable if planting small crops, like strawberries, melons, tomatoes, etc., is advisable, even in the earlier stages of growth, and it certainly is not unless a liberal quantity of some proper fertilizer is applied. As the tree enlarges and reaches out its arm-like branches, it asks for more food; it also asks that God's sunlight may be permitted to kiss it from topmost branch to root, and unless this request is granted it shoots skyward, bearing no fruit except upon its highest branches, and becomes liable to be attacked by numerous diseases.

Who has not noticed that a tree, standing solitary and alone, *always* bears a liberal quantity of fruit? Who has not noticed that such trees are invariably healthy? Who has not remarked that if the entire orchard was like this or that solitary tree, there would be money in fruit growing? Must so plain a lesson be unheeded? Can we not learn so simple a lesson without paying the immense price we do for tuition? The number of trees upon a given area does not determine the value of the orchard. If they are in excess of the proper number, they certainly are, comparatively, of little worth.

One argument used by those who favor close planting is that the shade thereby produced kills the grass and weeds which would steal the life-blood of the tree. This argument is born of pure laziness, and if carried into effect, as it too often is, the tree is deprived of its means of thrift, that its loafing owner may not blister his hands or burn his neck in his efforts to keep grass and weeds from choking his trees.

We have often walked through the orange groves on the lower Mississippi and been amazed at the imbecility so extensively displayed. A dense forest instead of an orchard, dead limbs and clinging moss, close thorny tops with

small, sour, gnarly, diseased fruit on the extremities, is the rule. Occasionally we find an orchard owned by a man who uses his brains for some useful purpose, and there we find fine trees, with sunshine all around them, with light, open branches, clean and smooth; large, perfect fruit on every twig and branch from top to bottom, far better in quality than his neighbor produces. In the first instance the fruit is difficult to dispose of, and prices are ruinous. The owner is always in debt and always will be. In the other case the fruit finds eager purchasers at remunerative figures. The owner "gets ahead" in the world by using a small modicum of brains with his muscle.

In raising fruit trees for profit, the following general principles should not be overlooked: 1. Effective drainage; 2. Thorough preparation; 3. Liberal fertilization; 4. Procuring best varieties; 5. Intelligent cultivation; and each of these general principles may be sub-divided, and each will afford the owner a theme for constant study.

That fruit growing, as now practiced, is non-paying, we are ready to admit; that it may be made immensely profitable, we confidently assert. To attain this desired object something must be done besides blindly treading in the footsteps of old ways and expecting nature to perform impossibilities.

The whole Southern country can be made a vast fruit-field. Any and every man may literally "sit under his own vine and fig tree." Millions can be annually added to our material wealth. There need be no poverty in such a country, and there will be none in the near future, when our almost boundless resources are more fully developed.

What Pears Shall I Grow?—What is said regarding the growing of apples, pears, field crops, flowers, or any plant or crop having a place in our agricultural or gardening operations, must be said with reference to certain wants, conditions, circumstances, or localities, if the directions would possess any value. No rule suits every case; no crop or plant is applicable to every locality; no advice meets every condition. Still, there are certain well-understood principles which are of value, because embodying the accumulated results of the best practice, under varying conditions and circumstances.

Now, as regards pears, a farmer or gardener who is to set a number of trees in spring would naturally ask, shall I set Dwarfs or Standards? To this there might be given several answers, and they would take shape something after this form: For profit, for permanency, for market purposes, the Standard; for quick returns at the expense of short life, for grounds of small extent, for family uses, the Dwarf. The Standards are long-lived, grow larger, and produce more fruit (one or two varieties excepted) than the Dwarfs. Besides, the trees seem to have the habit of growing wood for future use—a good quality where one is planting for profit and permanency. The Dwarfs, on the other hand, come into bearing young, are well adapted for garden culture, or where a few pears are wanted for family use, but at ten or a dozen years old have seen their best days.

The tree is most at home in a rather heavy loam, but it must be warm and rich, kept clean and mellow by frequent culture—something the trees delight in during the growing season. Animal manure, wood ashes, and farm compost are the best fertilizers, and these, as is well understood, should be applied in the fall. The best pear-growers are united in the belief that thorough and systematic pruning—not with saw and knife, on the butchering principle, but the pinching off all surplus young shoots, when

not over four to six inches long—regulates the growth and welfare of the trees, and has a tendency to induce the maturity of the fruit spurs, by which means an earlier and better quality of fruit is obtained, while the tree itself is kept uniform, well balanced and handsome. If those not experienced in pear culture are to set out trees, they certainly cannot have a better guide than to ascertain from growers in their own localities the varieties best adapted to their soil, situation, local circumstances, rather than to learn these points by their own, perhaps expensive, experience. A day spent in obtaining this information among one's neighbors will be time well used.

After all, one likes to see varieties. So here is one, made up after much study and inquiry, which it is believed will not vary greatly from the list which a hundred of the best growers in the best pear sections of New England would recommend. It is true some we have placed high on the list might be put down a peg or two, and others brought to the top which we have placed further down; but a list of the best eight varieties would be very likely to include these sorts, in about these positions: 1. Bartlett, a general favorite, of admirable quality and always salable at the highest price. 2. Seckel, high flavor, productive, uniformly bringing a good price in market. 3. Sheldon, a fine grower and good bearer, selling for the highest price. 4. Beurre d'Anjou, an excellent, productive and profitable sort. 5. Duchesse d'Angouleme, very popular and of the highest quality. 6. Beurre Bosc, an esteemed late sort, high flavored and much in demand as a market pear. 7. Lawrence, a good bearing sort, one of the best winter pears. 8. Vicar of Wakefield, very productive, and, as it ripens out of season of most others, finds a ready market at good prices.

Girdling Fruit Trees.—Some years ago, on an Iowa farm, a span of spirited horses, hitched to a wagon, got away from the driver and ran through the orchard, running over and badly barking some dozen trees. This was early in June. The next year those trees, and especially the limbs most barked and scarred, were full of fruit, while there was a very limited quantity on the balance of the orchard.

But what is the philosophy of this girdling trees or vines to make them bear fruit? Trees and vines do not grow merely by the absorption of moisture and material direct from the earth. It is true the roots take up from the earth the water and mineral matter necessary for plant growth, but it does not go directly to the part where it is to stay. But these go up, not between the bark and wood, but in the body of the tree or vine to the leaves, where it is combined with the carbon which is absorbed by the leaves, and goes through Nature's secret laboratory of combining water, mineral and carbon, until they are sufficiently digested to be used as wood growth, when it passes downward and is deposited in the infinitesimal cells beneath the bark. So that the growth is made by the downward flow of this prepared material for wood growth.

Now, if the tree or vine be girdled on the body or limbs, this prepared sap cannot pass below where the bark is taken off, and consequently that part above the girdle receives more than its share of sap, while none is supplied to the body below the girdle. Thus the limbs are crowded with growth food, which causes the development of fruit buds—makes the limbs grow faster and the fruit larger. But this process, if the main body of the tree is operated on, will in the end ruin the tree. The body and roots must have nourishment as well as the branches, and this girdling deprives them of this support. If this system is practiced at all, it should be only a part, leaving

the ungirdled limbs to supply nourishment to the balance of the tree. June is the time girdling is done, which is only intended as preparatory to the next year's crop. It is claimed, however, that girdling in June makes a more perfect development of the fruit then on the limbs.

Girdling is done by taking out a rim of bark entirely around the tree, limb or vine, not over one-fourth of an inch wide. Sometimes this space is healed up the first year, but certainly the second year, if the tree be not too feeble and sickly. We advise all to go slowly and carefully in this matter, but it is worthy of an experiment by all.

But yet there are many things which need studying, and diverse matters should be reconciled. One contends that girdling stops the rapid growth of the tree, and causes a more abundant fruitage. Another that girdling causes an abnormal growth of the limb, and the largely-increased production of fruit. Great are the mysteries of Nature.

Covering for Wounds of Trees.—It often happens that, either by intention, as in pruning, or by accident, trees are wounded in various ways. A common practice is to cover large wounds with coal tar; but this is objected to by some as injurious to the tree. Experiments made in the orchards and gardens of the Pomological Institute, at Ruthlegen, in Germany, go to show, however, that its true use is not injurious; but that, on the contrary, a callous readily forms under the tar, on the edges of the wound, and that the wounded part is thus protected from decay. There is, nevertheless, another objection: for if the tar is applied a little too thick, the sun melts it, and it runs down on the bark of the tree. This can be obviated by mixing and stirring and thus incorporating with the tar about three or four times its weight of powdered slate, known as slate-flour—the mixture being also known as plastic slate and used for roofing purposes. It is easily applied with an old knife or flat stick, and though it hardens on the surface, it remains soft and elastic underneath. The heat of the sun does not melt it, nor does the coldest winter weather cause it to crack—neither does it peel off.

The same mixture is also useful for other purposes in the garden. Leaky water-pots, barrels, pails, gutters, sashes, etc., can be easily repaired with it, and much annoyance and loss of time be thus avoided. It will stick to any surface, provided it be not oily; and as it does not harden when kept in a mass, it is always ready for use. A gallon will last for a long time.

A most excellent preparation for small wounds and for grafting, is thus prepared: Melt a pound of rosin over a slow fire. When melted, take it from the fire and add two ounces of balsam of fir (Canada balsam), or two ounces of Venice turpentine (not spirits of turpentine), stirring it constantly. As soon as it is cool enough, mix in four to six ounces of alcohol of 95 degrees strength—according to the season—until it is as thick as molasses. It keeps well in close-corked bottles for a long time. Should it become too thick, by the gradual evaporation of the alcohol, it is easily thinned by putting the bottle in warm water and stirring in sufficient alcohol to bring it to a proper fluidity. It is applied with a brush.

This preparation is much better than liquid grafting wax composed of resin, beef-tallow and spirits of turpentine, which often granulates. If there be any danger that the cions will dry up by evaporation, they may, beneficially, be brushed over with this composition, it being first made more fluid by adding alcohol. By this means I succeeded, in February of last year, in grafting a single eye of Ægle Sepinaria upon a lemon tree, in a dry sitting-room, without the use of any glass covering.

Preserving Fruit.—Light and heat are the agents in ripening fruits. The sagacious pomologist, therefore, keeps them in a dark place and at as low a temperature as possible short of freezing. Heat and moisture cause decay. Hence the fruit room, in addition to being kept cool, is also kept dry. These three conditions were observed by Professor Myce in his system of preservations, ice being used for cooling, and proper dryers for taking up the superabundant moisture. We have had ripe tomatoes kept for three months in such a house, and in the most perfect manner. Fruit-growers may arrive sufficiently near the mark, so that fruit may be kept perfectly during the cold months, by means of frost-proof walls, and a careful system of ventilation, avoiding a thorough draft.

Since fruit is easily affected by odors, care should be taken that the air of any fruit house should be kept clean and sweet. To this end nothing but fruit should be kept in the fruit house– at least nothing that will give off unpleasant odors. So particular are some in this respect that they will not keep apples and pears in the same room. To insure perfect cleanliness, the walls and floors should be frequently whitewashed with lime. We see no reason why the sub-earth air duct system may not be one of the best means for winter ventilation, as it certainly must be for summer ventilation.

With care fruits may be retarded in their ripening for long periods. When wanted for use they are removed to a warm and light place, where they quickly mature. When extra fine specimens are to be preserved, they are carefully packed in some dry odorless substance, as cotton-wool, bran, buckwheat hulls, dry oak leaves, or pure sand. Land plaster is said to be an excellent means for saving apples through the winter intact. A thin layer of plaster is placed in the bottom of the barrel, then a layer of apples, and so alternately layer of plaster and apples until the barrel is filled, when the barrel is headed and kept in a cool place until spring, coming out sound and intact. This plan should keep russets, and other varieties liable to shrivel, and those wishing to keep apples as late as possible, and having no fruit house, may find this plan valuable. There will be no loss in the plaster, for it will be worth all it costs, and more, for sowing on the land after the apples are used

Bark Lice on Apple Trees.—Judicious pruning of the branches, draining the land where the trees stand, manuring the soil and keeping it free from grass and weeds, all have the effect to promote vigorous growth, and are therefore useful in preventing the depredations of bark lice. Unless a vigorous growth of a tree can be insured, it is of little use to apply substances to kill the lice. The lady-bird, whose presence should always be welcomed on farms, is the mortal enemy of the bark louse, as it is of many other sorts of insects. But hurtful insects increase so much faster than useful birds do that we may never expect to see the latter exterminate the former. Indeed, no amount of cultivation and no number of birds ever collected in an orchard will be sufficient to clear it of the scale bark lice, if they are generally distributed among the trees. If but a few trees have bark lice on them, and they are well covered with them, it is best to cut them up. This heroic treatment will prevent their spreading to other trees. The time to kill the insects is when they begin to hatch. They are most readily killed by applying some wash to the bark with a stiff brush or swab. The articles most highly recommended for killing the lice are strong lye made of wood ashes, a solution of caustic soda of potash, diluted soft soap, and a mixture of lime whitewash and kerosene oil. If the latter is employed, the propor-

tions of the mixture should be one pint of kerosene to a gallon of the white-wash. Whatever substances are chosen, they should be applied thoroughly. To insure complete destruction of the insect, a second application should be made some days after the first.

Top Grafting Trees.—A practical fruit grower gives the following as his mode of top grafting: I have in a measure discarded the old system of cleft grafting, for a cheap, safer and easier way. I save the cions by cutting them in the fall or early winter, pack in sand or sawdust and keep in a cool cellar. After the trees have come out in leaf, during May and June, cut a bud from the cion and insert under the bark well tied and waxed to keep out the air and water, setting one bud in each leading limb all over the tree. In the course of two or three weeks these buds will have connected or else have died. For all that have connected saw the limbs off above the bud and throw the growth into them. Those that have died set again in July or August with buds taken from the new growth of wood, and cut them off the next spring. I set tops in that way in twenty seedling apple trees twelve years old in June, 1878, putting in on an average twelve to the tree. In 1884, six years from setting, they have forty bushels of Stark apples, worth one dollar per bushel. The expense of budding was ten dollars. If the same trees had been changed by cleft grafting the change would have cost two or three times that amount.

Hints on Marketing Pears.—Pears, whether early or late, should never remain on the tree until they become mellow. Whenever they have made their growth they should be gathered. It is easy to tell the proper condition by observing the ease with which the stem parts from the tree. If, on taking hold of the pear and lifting it, the stem readily breaks away from the spur to which it is attached, the fruit has received all the nourishment it can get from the tree, and the sooner it is gathered the better. Pears are sent to market in crates and half barrels; especially fine specimens are sent in shallow boxes, only deep enough for a single layer of fruit, and each pear is wrapped in thin white paper. Extra specimens of any of the standard kinds will bring enough more to pay for this extra care in packing. The early varieties mature quicker after gathering than the later kinds, but all should reach the market in a firm and hard condition. As with all other fruits, it will pay to carefully assort pears. Make three lots, firsts and seconds for market, and the third for keeping at home—for the pigs, if need be; there is positively no sale for poor pears.

Ants in the Orchard.—Many of the leading orchard proprietors in northern Italy and southern Germany are cultivators of the common black ant, an insect they hold in high esteem as the fruit grower's best friend. They establish ant-hills in their orchards, and leave the police service of their fruit trees entirely to the colonists, which pass all their time in climbing up the stems of the fruit trees, cleansing their boughs and leaves of malefactors, mature as well as embryotic, and descending laden with spoils to the ground, where they comfortably consume or prudently store away their booty. They never meddle with sound fruit, but only invade such apples, pears and plums as have already been penetrated by the canker, which they remorselessly pursue to its fastness within the very heart of the fruit. Nowhere are apple and pear trees so free from blight and destructive insects as in the immediate neighborhood of a large ant-hill five or six years old. The favorite food of ants would appear to be the larvæ and pupæ of

those creatures which spend the whole of their brief existence in devouring the tender shoots and juvenile leaves of fruit trees.

Cultivating the Orchard.—A successful fruit grower pursues the following plan: He plows his orchard one way, leaving strips close to the trees about eight feet wide, and plants potatoes, covering them with straw. In the fall, when he digs his potatoes, he piles the straw, and the next spring he plows the ground crosswise and plants again, using the same straw. After the straw has been used two years, it is turned under in the fall, to manure the ground. In this way his orchard is manured with very little trouble, and he cultivates his orchard at the same time. He says that he does not believe, from his own experience, that it is good for fruit trees to have the plow run any closer than four feet on each side, but thinks it better to cultivate in this way between the rows than to seed down to grass and pasture.

Hints on Gathering Apples and Pears.—Most people are disposed to gather the autumn fruits too soon. A rule is generally adopted by gardeners, that if the pips of the apples or pears are turning brown, the crop may be taken; but a decidedly dark and settled hue of the seed is a safer criterion. As to the objection that waiting late into the autumn causes a loss of the fruit by falling, it has little weight, because it is by this process that the weaker and least sound fruit is got rid of, while the best remains. Taking the crop too early will not only injure the good fruit by causing it to shrivel, but will also render frequent removals necessary in order to separate from the stock the rotten ones, which would, of themselves, have fallen from the tree if more time had been given.

To Preserve Pear Trees From Blight.—A New Hampshire fruit grower preserves his pear trees from blight by winding a rope of straw around the trunks so as to completely cover them from the ground to the limbs, keeping it on, moderately tight, through the season. His theory is that the blight is caused by the rays of the hot sun coming in contact with the body of the tree, heating the sap and causing it to dry up and the bark to grow to the wood of the tree.

Iron for Fruit Trees.—The scales which fly off from iron being worked at forges, iron trimming, filings, or other ferruginous material, if worked into the soil about fruit trees, or the more minute particles spread thinly on the lawn, mixed with the earth of flower beds or in pots, are most valuable to the peach or pear, and, in fact, supply necessary ingredients to the soil. For colored flowers they heighten the bloom and increase the brilliancy of white or nearly white flowers of all the rose family.

Secret of Raising Quinces.—Purchase the orange variety, and set the trees from six to eight feet apart in rich soil. Bandage the stem with two or three wrappings of old cloth as far down in the ground as possible, as the root starts from near the surface. Let the bandages run six or eight inches above the ground, then pack the soil a couple of inches around the bandages. This should be renewed every spring.

Fruit Pests.—At the time when fruit trees are blossoming, and when sparrows have commenced their annual raids upon them, a good way of driving away these diminutive plagues, consists of lime-washing the trees. When thus whitened, the birds disappear.

In the Vineyard.—We present herewith a brief illustrated article, from the pen of a successful grape grower, giving some hints and suggestions on the planting and culture of grape vines, which we think will be found interesting:

"I have been looking over my former years' work, have been reading back, or rather over again the views of others, and after studying all I took my spade and digging fork and went to an Isabella vine, planted some ten years or more since, and which has never shown any disease, but yearly ripened its fruit regularly and evenly. It was on clay soil. I dug carefully all around it a distance of four feet each way from the vine, or eight feet diameter, took out a trench with the spade, then with my fork I commenced to shake out roots, which I found much as here represented (Fig. 1).

IN THE VINEYARD.—FIG. 1.

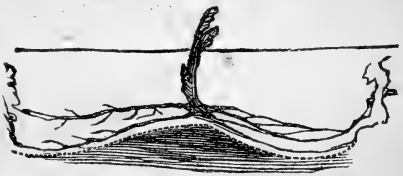
Of course the length of the roots is not here shown, for some I broke off in digging; but there was no direct tap root of any size, and altogether the larger portion of the roots were within ten inches of the surface. Small roots as large as a goose quill, it is true, were apparently down below. Some of them pulled upon lifting the vine, others broke off, but there was not a large or main root so situated. It may not be that this is any guide showing the general habit of roots of the vine, when grown in vineyards of clay soils and yearly pruned; but for the present I will so consider it, and when I plant avoid, as I have generally heretofore, setting the roots too deep. Most workers on the grape tell us that the roots must be planted deep, at least, they must have ten inches of soil over and above the upper root of the plant; and they tell us that if the plants are too small for such purpose, then we must excavate a basin, set the plant, and as it grows fill up around the stem. The accompanying figure shows this mode of planting as I understand it (Fig. 2). A straight line drawn across from the ends of the dotted line would show the level of the ground; the dotted line the excavation, with the plant having two eyes, and set in just deep enough to cover the lower eye or bud with soil. The roots are shortened as here shown to about eighteen inches in length and spread out regularly, setting the base of the main stem on a little mound or rise, not a sharp cone, but a broad mound.

IN THE VINEYARD.—FIG. 2.

The next manner of planting, highly recommended by a good cultivator, I have followed with good results. It is to prepare the ground where this plant is to stand by finely pulverizing it, then excavate a breadth or circle sufficiently wide to admit of straightening out the entire roots of the vine

without cutting away a single inch; make the excavation about six inches deep at the outside of the circle and rising so that the center is four inches below the level of the surrounding ground. Fig. 3 shows this method, the straight line being the surface of the mound on which the plant is placed before filling in the earth. This depth for planting I believe a good one."

Winter Care of Grape Vines.—All varieties of grape vines not thoroughly hardy should receive some winter protection to secure best results, and it is claimed by many that it pays to give protection to the hardiest kinds even. Some growers attribute their success with Delaware, Duchess, Roger's Hybrids, etc., simply to covering, while their neighbors signally fail with the same varieties. As the treatment in both cases is exactly alike, the different results can only be attributed to the protection given in one case and its omission in the other. The process is simple, and depends on the extent of the operation. After the vines have shed their leaves and matured their wood, they should be pruned, and on the approach of cold weather, loosened from the trellis, bent down on the ground, and held there with stakes, rails, or something similar. This is sometimes found sufficient, especially when snow lies till late in the spring. If not satisfied with this dependence, a slight covering with leaves, straw, cornstalks, limbs of evergreens, will prove effectual. If danger is to be apprehended from the depredations of mice, which in some sections are very troublesome, a slight covering of earth on the top is all that is necessary. It should be remembered that it is the young wood of the present season's growth that is to be protected—this contains the buds in which are the embryo fruit cluster for next year's crop. Of course, similar protection would not hurt the old wood, but it is not always feasible to provide it. But the main question necessarily preceding all this, on which depends the success or entire failure of the whole operation, is the maturity and thorough ripening of the wood.



IN THE VINEYARD.—FIG. 3.

Keeping Grapes.—In Europe a method of preserving grapes is now very generally followed. The cluster is cut with a piece of the cane still attached, and the lower end of the cane is inserted in the neck of a bottle containing water. Grapes thus treated are kept in a perfect manner for a long time. European journals have figured racks and other devices for holding the bottles in such a manner that they may sustain the weight of the fruit, and also to allow the clusters to hang free, and much as they would upon the vine. We are not aware that this method has been tried with our native grapes. These, even at the holidays, when the price is the highest, sell for too little to make this method of keeping profitable, but for home use, the experiment seems to be worth trying.

Keeping Grapes in Cellars.—If grapes mature perfectly they may be kept for a considerable length of time if cut without bruising, and hung up in a dry, cool, and rather dark cellar. The stem should be covered, when cut, with wax, and hung with the stem up. Immature grapes will not keep in this way or any other.

Keeping Grapes in Winter.—Perhaps among the many methods and devices employed in keeping grapes in their natural state for winter use, there will be found none better than the simple ones we here illustrate and describe. The first method is to take new soap boxes, or any other box of about that size, and nail cleats on the inside of the ends or sides about one inch from the top, and between them bars at various distances, as required by the varying length of the bearing shoot cuttings. The bars are made by nailing a small strip on top of each, as shown in our illustration, Fig. 1. As late as possible cut off the bearing shoots containing the bunches, with pruning shears, and shorten them so they will crowd between the end of the box and the top part of the bar, resting on the bottom part, thus hanging the bunches in their natural position. By this method the boxes can be handled without shaking the shoots off the bars, carried to the light, each bunch examined as winter advances, decaying berries or bunches removed, and the best kept without any moldy taste, as is so common when they are packed solid.

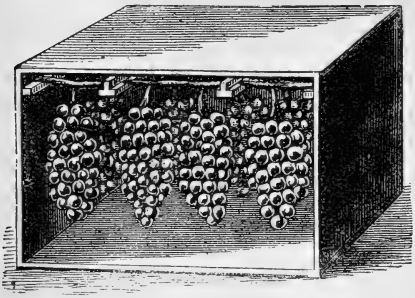


FIG. 1.—KEEPING GRAPES IN WINTER.

Another method of preserving grapes for winter, is in the first place to have the bunches as perfect as possible. Cut away all green, decayed or imperfect berries. Air them sufficiently to slightly dry or cure the stem, then keep the grapes cool, dry and in the dark. Shallow boxes, of about five inches in depth, are well adapted to keeping grapes, but the wood should not be of a resinous character but wholly odorless, that the fruit may not be tainted. Our illustration, Fig. 2, represents a plan adopted by the French, which is to suspend the bunches from hoops in a warm room or dry cellar. In this position they may be readily examined at any time. It is said that grapes will keep well treated in this manner.

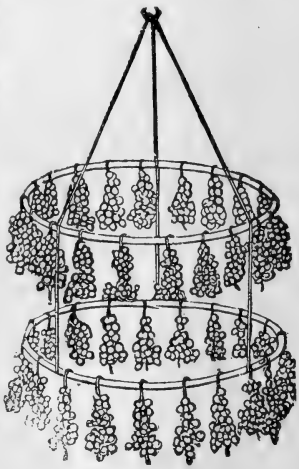


FIG. 2.—KEEPING GRAPES IN WINTER.

How to Prune the Grape.—The custom has usually been to prune in February, but we believe it would be better if done earlier. The excised portions should be cut up in pieces from one to two feet in length, as the buds might be best adapted to planting, tied in bundles of, say, one or two dozen, and buried a few inches under the soil

in a location whence the water would drain off, or under an open shed. There they would keep fresh and in full life until planting in the spring. The vines should be cut loose from the trellis and left to sprawl over the ground, in which position they will stand the winter much better.

A Cheap Trellis.—Our illustration upon this page gives a good idea of a permanent and quite cheap grape-vine trellis. The posts rest on stones sunk a little into the ground. The posts may be of any desired size of timber. A capping piece connects them along each side, and cross pieces join the opposite posts. Wire is used for the lattice work. Such a trellis costs about fifty cents a running foot, and is not at all unsightly.

A CHEAP TRELLIS.

Culture of Hardy Grapes.—J. T. Lovett, of Little Silver, the well-known New Jersey fruit grower, says in regard to the culture of hardy grapes: Plant in rows six feet apart, and the vines eight feet apart in the rows. Dig holes twelve to fifteen inches deep, and of a size amply large to accommodate the vines. They should then be filled to within six or eight inches of the top with fine, rich soil, throwing in while doing so a few bones or some wood ashes, if to be had. Cut back one-year vines to two eyes, placing the lower one below the surface; two-year vines to three or four eyes, and putting two or three eyes below the surface. Spread out the roots (which should have previously had one-third their length cut off), place the stock of the vine at one side of the hole, and fill with fine soil, pressing it firmly. When planted, set a stake at the stock (to which the vine should be kept tied), which will be all the support required for two years. Keep old wood trimmed off, growing fruit on new canes. Any manner of pruning that will admit the sun to the fruit will insure a crop; and laying the vines on the ground, even without covering, will increase both the quality of the fruit and the size of the bunches, besides insuring safety from injury by frost. For mildew dust with flower of sulphur while the vines are wet.

Bleeding Grape Vines.—It is stated that an English grape grower stopped the profuse bleeding of a thrifty grape vine by forming a sort of hard cement over the cut ends by repeated dustings at short intervals with Portland cement,

SMALL FRUITS.

Cranberry Culture.—The constantly increasing price of the cranberry, and the great numbers of marshes with alluvium soil free from clay or loam that one meets almost everywhere, prompts the question why cranberries are not more generally cultivated. Of all the self-supporting crops, none needs less care than the cranberry, if the conditions that govern its culture are first complied with, and none certainly shows greater financial results. The first essential is the marsh and its soil, with reference also to the ability to control the water supply. A soil having any proportion of clay should be avoided, and selection made of a combined decaying vegetable mass, with natural sand, and the less loam there is in this the better. Eastern growers cover their marshes with sand, but in the West, if the swamp, upon examination, seems to have a fair amount of sand or silex, it is quite probable that success may be attained in putting out the plants without this sand mulch. As a rule, it is a greater guarantee of success to have a stream of water crossing the marsh, for then in dry weather the gates can be closed and the marsh saturated, and if insect pests make their appearance the vines can be submerged for a day, which will make the worms loosen their hold, but the chances may be taken on a common "dry" patch of swamp. It is supposed that any one who attempts the culture of cranberries will make the dams and embankments of the most solid and substantial character, with gates that will not only work, but be water-tight, else failure will come with the first freshet. Ditching should next be seen to, and rapid drainage secured. This is done by a broad central channel and lateral ditches, which should not be at right angles to it, but approaching it in diagonal lines. The amount of water will have to be taken into consideration—the more water, the more ditches—a fact that will determine also the width of the main outlet. If the swamp is of some extent, it is to be presumed that a ditch at least six or eight feet in width will be needed. These ditches should not be over two feet in depth, and unless there are very heavy discharges of water from the uplands, or natural water courses, the side ditches need not be nearer than one hundred feet from each other. One ditch should always run parallel with and about six feet, or even more, from the dam; the soil thrown out can be utilized in building the dam. The planting requires some discernment. If the muck is covered with alders, reeds, and the like, a great amount of labor will have to be performed in advance, but the experience of a great many has been, where the muck was only covered with a growth of wild grass, that the ditching and consequent dry soil will so hinder its growth that the berry vines will thrive and soon force it into subjection, and, upon the whole, it will, in the first year of the growth of the cranberry, prove a source of profit in the way of protection from exposure and the like. By this method the labor of setting the vines will only be one of thrusting a narrow spade into the soil, pushing the handle over to one side, insert the plants, three or four in number, and press the soil firmly about the plants with the foot. Where weeds and wild sage have a strong hold upon the

swamp, the removal of the turf is the only way to succeed with the cranberries. To pay $50 and $75 an acre to clear the ground, in addition to the expense of ditching, seems a large outlay, but when the plants have established themselves and you find that the acre has produced one hundred to one hundred and fifty bushels of berries, worth $4 per bushel, the "light shines from an entirely different quarter." Planting these hills three feet apart each way gives both ample room and chance for cultivation, and in a couple of years the plants will occupy the entire ground, and if no chance is given to seed the ground with weeds, the care of the vines will be quite a small item for several years.

Preparing Soil for Strawberries.—Upon this subject E. P. Roe writes as follows: In the garden, light soils can be given a much more stable and productive character, covering them with clay to the depth of one or two inches every fall. The winter's frost and rain mix the two diverse soils to their mutual benefit. Carting sand on clay is rarely remunerative; the reverse is decidedly so, and top-dressing of clay on light land is often more beneficial than equal amounts of manure.

As practically employed, I regard quick stimulating manures, like guano, very injurious to light soils. I believe them to be the curse of the South. They are used "to make a crop," as it is termed; and they do make it for a few years, but to the utter impoverishment of the land.

And yet, by the aid of these stimulating commercial fertilizers, the poorest and thinnest soil can be made to produce good strawberries if sufficient moisture can be maintained. Just as a physician can rally an exhausted man to a condition in which he can take and be strengthened by food, so land, too poor and light to sprout a pea; can be stimulated into producing a meagre green crop of some kind, which plowed under, will enable the land to produce a second and heavier burden. This, in turn, placed in the soil, will begin to give a suggestion of fertility. Thus poor or exhausted soil can be made by several years of skillful management, to convalesce slowly into strength.

Coarse, gravelly soils are usually even worse. If we must grow our strawberries on them give the same general treatment that I have suggested.

On some peat soils the strawberry thrives abundantly; on others it burns and dwindles. With a soil, I should experiment with bone dust, ashes, etc., until I found just what was lacking.

No written directions can take the place of common sense judgment, and above all, experience. Soils vary like individual character. I have yet to learn of a system of rules that will teach us how to deal with every man we meet. It is ever wise, however, to deal justly and liberally. He that expects much from his land must give it much.

I have dwelt at length upon the preparation and enrichment of the land, since it is the corner stone of all subsequent success. Let me close by emphasizing again the principle which was made prominent at first. Though we give our strawberry plants everything else they need, our crop of fruit will still be good or bad in proportion as we are able to maintain abundant moisture during the blossoming and fruiting season. If provision can be made for irrigation, it may increase the yield tenfold.

When to Plant Strawberries.—The above question is often asked, and its answer must depend upon circumstances. One fact about the straw-

berry plant should be known, and this will enable each one to decide for himself. The plants that are sent out by nurserymen are those that were formed last year by the runners from old plants taking root in the soil of the bed. If these are taken up in the usual way and planted in a new bed—it may be after the lapse of several days—they require a whole season to get established and become sufficiently strong to bear a crop. If these plants are set this spring, they will bear a crop next spring; if such plants are set next autumn, they will require all of next season to grow in, and while they may produce here and there a few berries, they will give no real crop until the following year. Growers of fruit for market set a share of their plants in the fall, because then they have leisure and the ground is in excellent condition. If the plants are made to strike root in pots, these in early autumn may be planted in beds without any disturbance of their roots, and will give a fair crop next spring. Such plants are more expensive than others, and if a crop of fruit is wanted next spring, it is better to set out the plants now. Making the rows two feet apart, and setting the plants one foot apart in the row, as a general rule is best.

With regard to protecting strawberry plants, if some light material can be put over the plants that will not smother and rot them, and yet will be just enough to make shade from the winter sun and a screen from frosty winds, it will be doing a good turn to the strawberry plant. Manure is bad. There is salt in it, especially when fresh, which is destructive to foliage; but clean straw, or swamp, or marsh hay that is free from weeds, answers the purpose very well. But it must not be put on very thick. The idea is, just enough to make a thin screen, and yet enough to hold the moisture long. Shade without damp is the idea. Such light protection is good for the plant.

Covering Strawberries.—The strawberry endures cold well, writes a successful small fruit grower, but not the great sudden changes of temperature, and cold, drying winds. If the situation is such that the plants are not exposed to the winds, and the stools are large and thick with foliage, this foliage will be a sufficient protection; doubtful, however, should the snow be very deep and close packed, and lie long, or ice form on the surface of the ground, locking it for a long time. It is worse still if the frost extends deep into the ground. Under such circumstances the smothering influence may either kill the plant or seriously injure it. The plants without covering are safe where the winter is mild and the soil has perfect drainage. But the safe thing is to cover the plants. For perfect protection I find nothing so good as hemlock brush, or straw kept in place by a hemlock bough, with the concave side under, thus preventing the fatal pressure of the snow. I put on the covering at the beginning of winter, and keep it on until spring frosts are over. The plant will then come out fresh, strong and unharmed, and immediately push its growth.

This answers for a small plot of ground. For field culture, light stable manure with three or four parts of sawdust, or other fine vegetable absorbent, to one of manure, succeeds well as a covering, but should be used only where the soil requires the fertility, as too high manuring produces foliage rather than fruit.

Vegetable material worked into the soil is one of the best elements in the strawberry culture, as also in the culture of other berries. It loosens clay and improves the character of sandy soil, seeming also to form the right pabulum for the fruit. I also get the best crops and the finest berries in this way. Two weeks ago I gave the plants a sprinkling of liquid manure

(diluted urine), and they are brightening up and invigorated so as to withstand the winter better, and put out strong and early in the spring. This attention is only a trifle, but it helps a good deal. The strawberry, like the grape, is very susceptible to treatment, and can be made to do much more than we usually see.

Cultivation of Strawberries.—An Illinois journal says that the preparation of the ground for strawberries, and, indeed, for all berry fruits raised in the garden, is exceedingly simple. Any land rich enough to bring forty to fifty bushels of corn per acre, under good cultivation, will do. The ground should be plowed deeply and thoroughly well pulverized. Mark the land if for field culture, the distance as for corn. If for garden culture, the field may be marked both ways, and one good plant placed at each intersection, spreading the roots naturally, placing the plants so the crowns will not be above the surface, giving a little water to the roots if the soil be not fairly moist, and after the water has settled away, drawing the dry earth over all. For garden culture, one plant to three feet of space will be sufficient, unless the plants are to be raised in stools, and the runners kept cut out, when a plant to each two feet will be about right, if you want extra large berries. The cultivation is simple. The spaces between the rows, about two feet wide, may be kept clean with the cultivator. In the rows the weeds may be kept, early in the season, clean with the cultivator; later, when the runners have encroached on the rows, the weeds must be pulled out if necessary, but on fairly clean soil, the cultivation will not be difficult. Beds of the previous year, and which should be in full fruit this season, may be kept clean between the rows with the cultivator. The weeds will not trouble much until the crop is gathered.

About Raspberries.—Not one-half the people grow raspberries that should. To say nothing of the excellence of this fruit freshly taken from the vines, with cream or without, it is really the best there is for canning, and either raw or canned it finds a ready market. It is easily cultivated, produces large crops, and has few insect enemies.

In starting a bed the best time is in the fall, but if neglected then, plant early in the spring, pressing the earth firmly about the roots and cutting the canes off six inches high. Count all suckers as weeds except three to five to the hill. The hills may be four feet apart each way, so they can be worked with the plow and cultivator. No stakes are needed, for the canes are kept stocky by being pinched off hen about a yard high.

As to varieties, of course there is none better for this locality than the Brandywine. It is true and tried. It carries well to market, and its bright red color makes it the most salable berry in the catalogue. For home use alone it is no better than the Herstine, but this is not solid, and the plants need covering in winter north of this latitude. The Herstine is a splendid berry—good enough for anybody. The Philadelphia is a valuable old standard, but is soft and too dark in color. The Reliance is nearly of the same color, but we believe every way better than the Philadelphia.

The Cuthbert is immensely praised just now, and so many unite in commending it, that it certainly must have merit. It is perfectly hardy, and thrives North and South. It is said to be very productive, the berries are immense, and the bearing time holds on a long time. The Queen of the Market is quite similar to the Cuthbert, in fact so nearly alike are the two berries, that many consider them identical.

The above are all red varieties. Of the black caps the Mammoth Cluster is the old popular variety, but the new Gregg is said to be greatly superior to it.

The Blackberry and Whortleberry.—Those who find it difficult to get good ripe blackberries and whortleberries may be glad to know that they can be grown in their own gardens as well as the strawberry, and that with the right treatment they will surpass in flavor and size any which may have grown in their grandfather's day. The low-bush or running blackberry grows best on a warm soil of either sandy loam or gravel, and when properly grown and well ripened is much better than any of the high bush varieties. The plants should be set in May, in rows three feet apart and two feet in the rows. Care should be taken to select good strong young roots, and those which bear large sweet berries, avoiding those which bear the sour berries that ripen later in the season; it is best to mark the plants when the fruit is ripening, or secure the assistance of one who knows where the right variety grows. For garden culture the ground should be well hoed the first part of the season, and mulched with leaves or hay about the first of August. If properly cared for the first year, but little needs to be done the next spring; the crop will be large if the vines are well supplied with water during the ripening season; during this time they require quite as much water as the strawberry. The berries should not be picked until fully ripe, and to be in the best condition for sauce should be picked but a short time before eaten; when thus picked, they surpass in richness and flavor the strawberry; as it cannot be transported when fully ripe, any better, if so well as the strawberry, its good qualities are known only to those who cultivate it in their own garden, and understand the right time to pick it. But few dishes can be placed upon the table so acceptable as a dish of good, well-ripened blackberries of the variety which grow on the low running vines. To keep the garden clean, new vines should be set every year, and the old ones removed as soon as the berries are picked. The whortleberry, both the high and the low-bush, requires a different treatment from the blackberry; it will grow on almost any soil. Bushes should be selected that are known to produce large-sized and good flavored berries; they should be set near enough together to shade the ground; a large portion of the top should be cut off; the ground be mulched with a heavy coat of leaves, and should not be disturbed by cultivation, but should be kept well mulched until the bushes are thick enough and large enough to shade the ground, and thus they protect themselves; when once established they require but little care. When the bushes seem to have too much old wood to bear well, they should be cut down to the ground in the autumn; the next year they will make a vigorous growth, and the year after bear some very large berries, but not a full crop until the following year.

Gooseberries and Currants.—There is no reason why both these very useful fruits should not be found abundantly in every garden. They are no trouble to raise. They grow readily from cuttings. Take the wood of last year, from six to ten inches in length; prepare the bed or place where they are to stand permanently; force them into the ground not less than four inches, press the dirt firmly around them, mulch them, and let them alone. If a brush is desired let the buds on the cuttings remain; but if a tree or single stem be preferred, remove all the buds that would go beneath the surface. Let them stand about three feet in the row; and if there is more than one row, let the rows be four feet apart.

In the spring the dead wood of both the gooseberries and currants should be cut out, and the new growth should be thinned where there is too much, as it will interfere with the product. The best red currant is the Dutch, and the best gooseberries are Downing's Prolific and Houghton's Seedling.

Advantages of Mulching.—The Germantown *Telegraph* says: "Although we have suggested many times in the past the great advantage of mulching raspberry and blackberry beds, it cannot be suggested too often. But this mulching should not be done or rather renewed in the season until the heat of the sun or drought requires it; neither should it be done until after the suckers or new plants show themselves and are of sufficient height not to be injured by the application of the mulch, which, if too thick and applied too soon, will in a great measure prevent the sprouting, and where it does not will cause the sprouts to be weak and spindling. Currant bushes also delight in a moist, cool soil, and mulching provides this if applied in sufficient quantity. Anything in the way of weeds, small branches of trees, grass from lawn cuttings, etc., will answer. The mulching of tomato plants, egg plants, etc., will prove very beneficial. We know that some persons have not our faith in mulching, and prefer beds of plants, young trees, etc., to have the soil stirred up about them frequently. This, we are aware, is excellent, but it does not hinder the mulching also. Let the old mulch be removed, the soil well loosened, and then apply fresh mulch."

Fall Setting of Small Fruits.—It is urged that those contemplating setting small fruits should give one trial at least to fall setting. All that is necessary is to either back up over the roots with earth, or throw a forkful of litter over each plant, before the ground freezes up, and in the spring haul this away. First, because they get settled in their place, and getting the benefit of early spring rains, start early, and make a full growth next season, while if set next spring, it cannot be done properly until the ground is settled and the heavy spring rains have ceased. Second, all fruit growers know how pressed they are for time in the spring. Third, raspberries and blackberries have very tender germs that start very early in the spring, and these are likely to be broken off if set then, while if set in the fall, they have not started enough to damage them in transplanting. And fourth, but not least, a much larger proportion of them live when set in the fall—a fact abundant in itself to show the superior merits of fall planting, especially of blackberries, raspberries, currants, grapes, and such sorts.

Red Raspberry.—There is no fruit that is in greater demand at such paying prices, and with which the market is so poorly supplied, as the red raspberry, and one reason why the market is so poorly supplied is because there has been sent over the country so many tender sorts that have so easily winter killed, but now with such hardy and productive sorts as the Brandywine, Philadelphia, Turner, Highland Hardy, Thwack and Cuthbert, and that succeed so well wherever tried, there is no excuse for not having this delicious fruit in abundance. Another reason why they pay so poorly is that they have been allowed to grow helter skelter all over the ground. If you would have fruit in abundance, and of larger size, the suckers must be kept down same as weeds, and the same cultivation that will keep the ground in proper plight and keep weeds down will keep suckers down.

Easy Method of Cultivating Small Fruits.—A writer in the New York *Tribune* says: "It is a source of constant regret with farmers that

small fruits require so much care and attention, and that, too, in the season when they are hardest at work at something else. Field work must be done at all events, and the 'berry patch' struggles on single handed with the weeds and grass, till it submits to the inevitable sward. Some years ago coming into possession of a patch of black cap raspberries that had received the usual shiftless culture, I treated them in the following way: After carefully plowing and hoeing them, I covered the ground with a heavy layer of very strawy manure, and the work was done, not only for that year but for the two years following, only renewing the mulch each spring. Only a few struggling Canada thistles will ever grow through such mulch; the soil is always rich and moist, and the berries can ask no better treatment. Since that time I have tried the same plan without removing the sod, and find the result is quite as satisfactory. Farmers, try it, and you will not need to complain that berries cost more than they are worth.

Winter Protection of Strawberry Vines.—A good strawberry protector is a cheap baked-clay saucer, twelve to thirteen inches in diameter, with a hole in the center. The advantages claimed by its use are: a much larger crop; much finer berries; cleaner, and free from sand and dirt; mulching the ground; the retention of the rains to the roots of the vines; killing the weeds; early ripening; easier picking. They are turned over as a winter protection to the vines. Persons who have used it pronounce it the most important invention ever made in connection with strawberry raising.

Setting a Strawberry Bed.—The old plan of spading under a portion of the old strawberry bed, so as to leave the plants in rows, will not pay. Better reset clean land with vigorous plants, arranging to grow a crop of potatoes every third year to clean the land and mellow it. The picking of berries on heavy clay lands causes it to become so packed as to require cultivating at least one season in every four with some hoed crop. Strawberry plants may be set in May or in August; in fact, at almost any time during the spring, summer or fall season.

Easy Method of Disposing of the Currant Worm.—A successful small fruit grower circumvents the ravaging currant worm by allowing no sprouts to grow. He allows but three main stems to a bush, and rubs off all root sprouts when about six inches long. The worms begin with the new growth first; hence, he says, no sprouts, no worms. The fruit also is far finer on plants thus treated, the common red Dutch being nearly as large as the Cherry currant, and a better bearer.

An Easy Method of Irrigation.—An old fruit can may be pierced with one or more pin holes, and then sunk in the earth near the roots of the strawberry or tomato, or other plants, the pin holes to be made of such size that when the can is filled with water the fluid can only escape into the ground very slowly. Practical trials of this method of irrigation leave no doubt of its success. Plants thus watered yield bounteous returns throughout the longest droughts.

Trellises for Blackberries and Raspberries.—The fruit canes of the blackberries and raspberries should be tied up to stakes or trellises. The young growing canes form the fruiting ones for next year; cut away all except three to five to each stool, and when large enough tie them up; they should be pinched off at four feet for raspberries and six feet for blackberries.

LIVE STOCK.

How to Judge a Horse.—1. Never take the seller's word. If disposed to be fair, he may have been the dupe of another, and will deceive you through representations which cannot be relied upon.

2. Never trust a horse's mouth as a sure index of his age.

3. Never buy a horse while in motion; watch him while he stands at rest and you will discover his weak points. If sound, he will stand firmly and squarely on his limbs without moving any of them, feet planted flat upon the ground, with legs plump and naturally poised. If one foot is thrown forward with the toe pointing to the ground and the heel raised, or if the foot is lifted from the ground and the weight taken from it, disease of the navicular bone may be suspected, or at least tenderness, which is a precursor of disease. If the foot is thrown out, the toe raised, and the heel brought down, the horse has suffered from lamnitis, founder, or the back sinews have sprained, and he is of little future value. When the feet are all drawn together beneath the horse, if there has been no disease, there is a misplacement of the limb at least, and weak disposition of the muscles. If the horse stands with his feet spread apart, or straddles with his hind legs, there is weakness of the loins, and the kidneys are disordered. When the knees are bent, and totter and tremble, the beast has been ruined by heavy pulling, and will never be right again, whatever rest and treatment he may have. Contracted or ill-formed hoofs speak for themselves.

4. Never buy a horse with a bluish or milky coat in his eyes. They indicate a constitutional tendency to ophthalmia, moon-blindness, etc.

5. Never have anything to do with a horse who keeps his ears thrown backward. This is an invariable indication of bad temper.

6. If the horse's hind legs are scarred, the fact denotes that he is a kicker.

7. If the knees are blemished, the horse is apt to stumble.

8. When the skin is rough and harsh, and does not move easily and smoothly to the touch, the horse is a heavy eater, and digestion is bad.

9. Avoid a horse whose respiratory organs are at all impaired. If the ear is placed to the heart and a wheezing sound is heard, it is an indication of trouble.

Feed for the Horse.—One of the most sensible articles on the treatment of a horse is that which is given from a physiological standpoint by Colvin.

It is the opinion of this authority that the horse's stomach has a compacity of only about 16 quarts, while that of the ox has 250. In the intestines this proportion is reversed, the horse having a capacity of 190 quarts against 100 of the ox. The ox, and most other animals, have a gall bladder for the retention of a part of the bile secreted during digestion; the horse has none, and the bile flows directly into the intestines as fast as secreted. This construction of the digestive apparatus indicates that the horse was formed to eat slowly and digest continually bulky and innutritious food. When fed on hay it passes very rapidly through the stomach into the intestines. The

horse can eat but about five pounds of hay in an hour, which is charged, during mastication, with four times its weight of saliva. Now, the stomach, to digest well, will contain but about ten quarts, and when the animal eats one-third of his daily ration, or seven pounds, in one and one-half hours, he has swallowed at least two stomachfuls of hay and saliva, one of these having passed to the intestines. Observation has shown that the food is passed to the intestines by the stomach in the order in which it is received. If we feed a horse six quarts of oats it will just fill his stomach, and if, as soon as he finishes this, we feed him the above ration of seven pounds of hay, he will eat sufficient in three-quarters of an hour to have forced the oats entirely out of his stomach into the intestines. As it is the office of the stomach to digest the nitrogenous parts of the feed, and as a stomachful of oats contains four or five times as much of these as the same amount of hay, it is certain that either the stomach must secrete the gastric juice five times as fast, which is hardly possible, or it must retain this food five times as long. By feeding the oats first, it can only be retained long enough for the proper digestion of hay, consequently it seems logical, when feeding a concentrated food like oats, with a bulky one like hay, to feed the latter first, giving the grain the whole time between the repasts to be digested.

Feeding Horses.—Another authority writes as follows: The horse has the smallest stomach, in proportion to his size, of any animal. This space is completely filled by four quarts of oats and the saliva that goes into the stomach with it. Horses are generally overfed and not fed often enough. For a horse with moderate work six or eight quarts of bruised oats and ten pounds of fine hay are sufficient. This should be fed in three meals, and is better if fed in four. A horse's digestion is very rapid, and therefore he gets hungry sooner than a man. When he is hungry he is ineffective, and wears out very rapidly. Water fills the stomach, lowers the temperature, and dilutes the gastric juice; therefore a horse should not drink immediately before eating. Neither should he be watered immediately after eating, because he will drink too much and force some of the contents of the stomach into the large intestine, which will cause scouring. Scouring is also caused by too rapid eating, which can be prevented by putting half a dozen pebbles half the size of the fist into the manger with the oats. Give only a moderate drink of water to a horse. A large drink of water before being driven will have a very quieting effect on a nervous horse. A race horse always runs on an empty stomach. Digestion progresses moderately during exercise, if the exercise is not so violent as to exhaust the power of the horse. I consider bruised oats worth twenty per cent. more than whole. They are more perfectly digested. I prefer oats to any other grain for horses. Cracked corn is good under some circumstances, but I would not use meal or shorts. The disease called big head is caused by feeding corn. When a horse comes in hot I would give a moderate feed immediately. If the horse is too tired to eat I would take the feed away. A heated horse is a reason against watering and for feeding, for the system is just then in a condition to begin digestion. A horse will not founder if fed immediately when hot. I prefer dry feed, unless the horse has some disease of the throat and lungs. I do not consider it worth while to cut hay. I always feed hay from the floor, then the horses do not get particles in their eyes.

Raising a Colt.—A colt is regarded as an incumbrance because he is useless until he arrives at a suitable age for work, but it really costs very

little, compared with his value, to raise a colt. When the period arrives at which the colt can do service, the balance sheet will show in its favor, for young horses always command good prices if they are sound and well broken. One of the difficulties in the way is the incumbrance placed on the dam, which interferes with her usefulness on the farm, especially if the colt is foaled during the early part of the spring. Some farmers have their colts foaled in the fall, but this is open to two objections. In the first place, spring is the natural time, for then the grass is beginning to grow, and nature seems to have provided that most animals should bring forth their young in a season beyond the reach of severe cold, and with sufficient time to grow and be prepared for the following winter.

Again, when a colt is foaled in the fall he must pass through a period of several months' confinement in the stable, without exercise, or else be more or less chilled with cold from time to time. Should this happen, the effect of any bad treatment will be afterward manifested, and no amount of attention can again elevate the colt to that degree of hardiness and soundness of body that naturally belongs to a spring colt. Besides, a colt foaled in the spring will outgrow one foaled in the fall. An objection to spring colts may be partially overcome by plowing in the fall, or keeping the brood mares for very light work, with the colts at liberty to accompany them always. A colt needs but very little feeding if the pasture is good and there is water running through it. He needs then only a small feed of oats at night—no corn—and if he is given hay it is not necessary to give him a full ration. What he will consume from the barn will not be one-third his value when he is three years old, and if he is well bred the gain is greater.

When a farmer raises his horses he knows their disposition, constitution and capacity. It is the proper way to get good, sound, serviceable horses on the farm. It should not be overlooked that a colt must be tenderly treated from birth, and must be fondled and handled as much as possible. He should never hear a harsh word, but should be taught to have confidence in everybody he sees or knows. This is an easy matter if his training begins from the time he is a day old. He can be thus gradually broken without difficulty, and will never be troublesome. No such thing as a whip should be allowed in a stable that contains a colt. Colts should not be worked until three years old, and then lightly at first, as they do not fully mature until they are six years old, and with some breeds of horses even later. Mares with foals at their side should be fed on the most nourishing food.

To Bit a Colt.—The true way to bit a colt is not to bit him at all; that is, let him bit himself. When my colts are one year old, I begin to teach them to hold the bit in their mouth. The bit is of pine, some half-inch in diameter, and five inches in length. This piece of soft pine is held in the mouth by a cord tied to either end, and fastened on the head, back of the ears. The colt loves to have the bit in his mouth, because it enables him to bring forward the saliva process. He will bit, and work it over in his mouth, and enjoys it hugely. He will welcome it, and will actually reach out and open his mouth for it, as a trained horse will for a bit. After a few days, you can tie strings making miniature reins to this bit, and teach the colt the proper use of it. When this is done, he is ready for the regular steel bit. Put your bridle on with a leather bit, large and pliant; throw your checkline, if your bridle has one attached, into the pigsty; get into your wagon and drive off. This is all the "bitting" a colt needs. Treated in this way, he will have a lively, yielding, sensitive mouth. He will take the bit bravely

when working up to his speed, but yield readily to the driver's will. A horse, bitted in this sensible way, can be driven a forty-clip with the lines held in one hand, or be lifted over a five-barred gate with the strength of a single wrist. If you do not believe it, try it and see.

HORSESHOE.—FIG. 1.

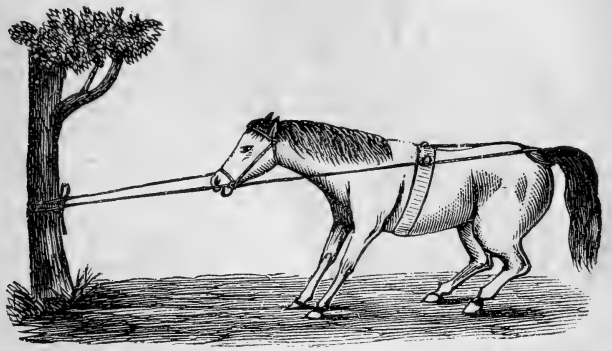
A Convenient Horse-shoe.—Among the numerous horseshoes lately devised in this and other countries, that invention in England, by Mr. Joseph Offord, seems worthy of special notice. Its object is to fit the hoof with a movable but firm covering, which can be readily adjusted to fit every kind of work and road, so that, like its master, the horse may own several sets of shoes for different occasions. The device consists in having one or more perfectly wedge-shaped holes in the side and close to the edge of each shoe (Fig. 1), in which triangular cogs, or wedges, are inserted. These are fastened by the fangs being brought, without touching the hoof, to the outside of the shoe, over which they are clenched with a small hammer. The cogs do not penetrate the hoof, and there is no risk of hurting the horse. The holes being wedge-shaped, cannot fill up with stones or dirt, and the fangs being malleable, the wedges are easily removed or inserted at pleasure. It is necessary, however, to get the holes punched in the shoes before the horse is shod, and for the coachman to be provided with a supply of these patent cogs to insure safety on any road in frost or on wood.

HORSESHOE.—FIG. 2.

As many are accustomed to use a cog which screws into the shoe, Mr. Offord has prepared a steel wedge-shaped one (Fig. 2) for this purpose. The screw cogs are, of course, more expensive. In using them the shoe has to be drilled and tapped with one or more holes before the horse is shod. The cogs are inserted into these holes when needed, or removed at pleasure by means of a wrench provided

for this purpose. We give two illustrations, reproduced from the *Agricultural Gazette*, showing both these methods, with the punch, wrench, and cogs, both of which have stood the test of many years' experience, and have given great satisfaction.

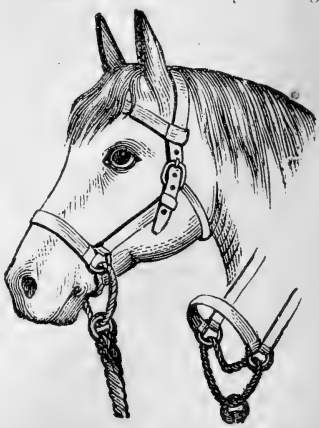
To Break Horses from Pulling at the Halter.—Two methods of breaking a horse of this habit are here illustrated, as follows:



TO BREAK HORSES FROM PULLING AT THE HALTER.—FIG. 1.

Fig. 1.—Get a strong half-inch cord twenty-two feet in length; put the center under the tail like a crupper; twist them a few times as you bring them forward over the back; pass forward on each side of the body; the pass them forward through the halter below the jaw. Tie firmly to a tree, post, or stall, and excite the animal by any means that will cause him to pull, until the habit is overcome. You may even whip across the nose keenly until there is perfect submission, which will not require long. Hitch in this way for a few days, or so long as there is is any predisposition to pull on the halter.

Fig. 2.—This contrivance consists of an ordinary ring halter, with the two side rings connected by a strong, flexible cord. Whenever the horse pulls, the inner part of the cord is drawn forcibly against his jaw, and the effect is a severer punishment than he is willing to endure.



TO BREAK A HORSE FROM PULLING AT A HALTER.—FIG. 2.

Warts on Horses.—A correspondent of an English agricultural journal writes: "Inquiries are made for a cure for warts on horses, mules, and cattle. Many remedies are prescribed

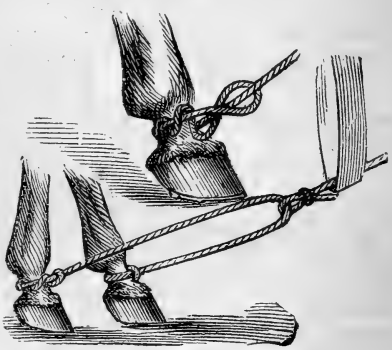
—many barbarous and cruel to the animal. I will give you a remedy often tried, and never known to fail. Anoint the wart three times with clean, fresh hog's lard, about two days between times. I have had warts on my horses—bleeding warts, of large size, rattling warts and seed warts, to the number of more than one hundred on one horse's head. I have never been able to find the warts for the third application of the lard. All disappear after the second application. I have sent this prescription to several agricultural papers, hoping it would be of some use to farmers. But they all seem slow to believe, perhaps, because the remedy is at hand and costs nothing. I own I was slow to believe myself; but, having a fine young mare with large bleeding warts, that covered parts of the bridle and girths with blood whenever used, I thought there would be no harm in trying lard on them. When the mare was got up for the third application, there were no warts, and the scars are there now, after more than fifteen years, with very little change. I may say that for cuts, bruises, galls, etc., the application of fresh lard—either for man or beast—is worth more than any patent liniment in use. It will remove pain instantly, and does not irritate raw flesh, as all liniments do.

Stumbling Horses.—The Pittsburg *Stockman* says: "Some good horses are addicted to stumbling while walking or moving in a slow trot. A well-versed veterinarian states that there are two causes that would tend to produce this faulty action; one a general weakness in the muscular system, such as would be noticed in a tired horse; the other a weakness of the exterior muscles of the leg, brought about by carrying too much weight on the toe. To effect a cure, he adds, lighten the weight of each front shoe about four ounces; have the toe of the shoe made of steel instead of iron, it will wear longer, have it rounded off about the same as it would be when one-third worn out, in order to prevent tripping, allow one week's rest; have the legs showered for a few minutes at a time with cold water through a hose, in order to create a spray; then rub dry briskly, from the chest down to the foot. Give walking exercise daily this week, for about an hour, twice a day. When you commence driving again omit the slow jog—either walk or send him along at a sharp trot for a mile or two, then walk away, but do not speed for at least several weeks. By this means the habit of stumbling from either of the above causes will be pretty well overcome.

Cure for Balky Horse.—Hermann Koon, my German neighbor, writes a correspondent of the *Prairie Farmer*, is as patient a man as belongs to that patient race. Coming along the road a month or so ago, I saw Hermann lying in a fence corner, under the shade of an elm, quietly smoking his pipe. A quarter of a mile or so beyond I saw Hermann's horse and buggy by the roadside, the horse evidently tied to a post. This was a queer condition of affairs, for my neighbor is one of the most industrious men I know. My curiosity was aroused, and I stopped for an explanation. In broken English he told me his horse, a recent purchase, had proved balky, had stopped near where he now stood and no amount of coaxing could induce him to go on. Hermann did not curse the animal, he did not lash it with his whip, beat it with a club, build a fire under its belly, nor resort to any other of the brutal means some men use in such cases. He quietly got out of the buggy, tied the horse to the post, and walked off. Hermann had been taking it easy under the tree for three long hours. He thought the horse would be glad to go now if requested to do so. It had once before stopped

with him, and after a patient waiting alone, for an hour, it went on all right. He expected about four hours, this time, would effect a permanent cure of the bad habit. I went on about my business, leaving the stolid German to his pipe and his thoughts. To-day I met him again. He said the horse was eager to start when he went back to the buggy, and though he has used it every day since, no disposition to balk has been manifested. He believes there will be no repetition of the offense. Most men think they cannot afford to waste time in this way, perhaps, but if the horse is cured he is a valuable one, whereas, if it had become a chronic balker, through cruel management, it would be worthless. Hermann thought he could not make money faster than by saving the reputation of his horse. It is a new system, but Hermann says it will work well every time, if the horse is not naturally vicious. It looks reasonable to me, and if my nag ever tries the stop game with me, and I can command patience sufficient, I will try his plan.

Kicking Horses.—We present herewith a method that will be found available in all cases of kicking by horses. The beast should have a good pair of bits in his mouth, to which should be attached a strap or rope sufficiently long to reach back between and behind the fore legs about eight inches, and should pass through the girt or surcingle. A loop should be made in this, the back end of the rope or strap, about two inches or more in length. Now take a rope about seven or eight feet long. (The length of the rope will depend upon the size of the horse; the rope should be long enough to allow of a free use of the horse's hind legs in traveling.) Pass one end of the rope round the leg, upon the inside, so the fastening shall come upon the outside, to prevent interfering, and bring it round upon the outside of the leg, and pass the end over and around the middle of the rope and wind it round the rope upon the outside of the leg, as illustrated. Draw the noose up round the pastern—i. e., between the fetlock and hoof—and pass the unfastened end of the rope through the loop in the rope or strap which passes through the surcingle, and fasten the end round the other leg, as was done the first time in fastening. This mode of fastening is simple, is easily done and undone, and will not work off, provided the noose is drawn up tightly around the pastern. If you have a horse that is addicted to the unpleasant habit of kicking, try this experiment, and you will find that it works admirably.

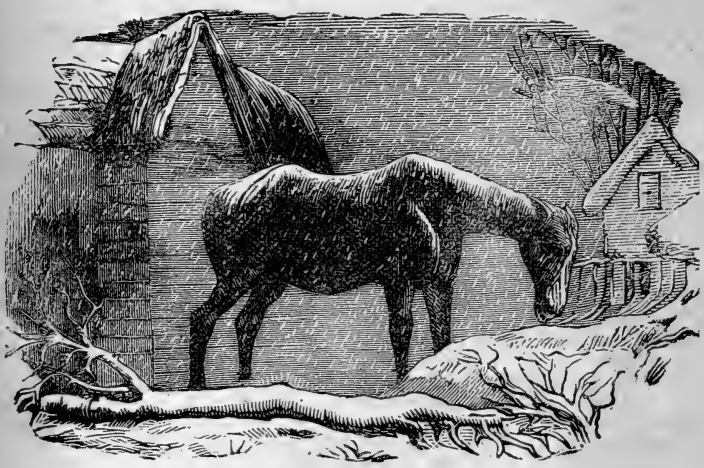


HOW TO PREVENT HORSES FROM KICKING.

Training Vicious Horses.—A new and very simple method of training vicious horses was exhibited in West Philadelphia, and the manner in which some of the wildest horses were subdued was astonishing. The first trial was that of a kicking or "bucking" mare, which her owner said had allowed no rider on her back for a period of at least five years. She became tame in about as many minutes, and allowed herself to be ridden about without a

sign of her former wildness. The means by which the result was accomplished was a piece of light rope which was passed around the front jaw of the mare just above the upper teeth, crossed in her mouth, and thence secured back of her neck. It was claimed that no horse will kick or jump when thus secured, and that a horse, after receiving the treatment a few minutes, will abandon his vicious ways forever. A very simple method was also shown by which a kicking horse could be shod. It consisted in connecting the animal's head and tail by means of a rope fastened to the tail and then to the bit, and then drawn tightly enough to incline the animal's head to one side. This, it is claimed, makes it absolutely impossible for the horse to kick on the side of the rope. At the same exhibition a horse which for many years had to be bound on the ground to be shod suffered the blacksmith to operate on him without attempting to kick while secured in the manner described.

Galls and Sores on Horses.—If the owner of the horses, the farmer



ONE CAUSE OF HIDE-BOUND.

himself, could always be among his work animals, they would receive more attention and better treatment; but as he has so much to think about and look after, he cannot give this department his careful supervision, and many errors creep into the management which could not otherwise be found there. There are some horses which chafe more readily than others, while some do not have the collars and harness fit them, which will invariably cause galls or sores; and even when the harness does fit properly, the warm weather, or giving the horse a hard, warm day's work, may cause shoulder or saddle galls to appear, which will soon become larger and bad sores, if not promptly attended to. Bathing the shoulders, with spring or well water hardens them, and decreases the tendency toward galling. When galls appear, wash the affected parts with good white castile soap (only use the best castile and none other), and warm water to cleanse them. After the parts

have been dried with a soft cloth or rag or sponge, anoint the parts with a mixture of pure glycerine in which a little carbolic acid has been mixed. Do this at night after work. In the morn cleanse well again, as above, and put on some pulverized alum if you work the horse regularly. Continue this course until the sores are perfectly healed up.

Working Mares in Foal.—It is quite common to see or hear inquiries as to how near the time of foaling, a mare may be worked without injury to her or the colt, on the supposition that it is necessary for her to go idle for a month or two before.

This is not the case; and in the hands of a careful man she may be kept at such work as plowing, harrowing, or cultivating without the least danger, until she is ready to foal. Of course, fast driving or working to a heavy wagon tongue, on rough or muddy roads, or where heavy backing is to be done, should not be allowed. The writer has always worked mares moderately on the farm, when necessary, until it was evident they were likely to foal within a few hours, and has known of their foaling in harness, en route from the plow to the barn, but never with any bad results. While we think it more humane to let a mare have a few days' liberty before this trying event, there seems to be little necessity for losing the work of a strong mare for any great length of time before foaling, and we would prefer to allow the extra holidays afterward. Ordinarily, she will do first-rate work with a ten days' vacation, provided that she is not put immediately to work that is too severe, and fed partly with something else than corn.

Kicking in the Stall.—The habit of kicking in the stable arises from idleness. Regular day work is the best remedy, but when that is not sufficient, a branch or two of some prickly shrub, nailed to the posts, will often stop the habit, care being taken to arrange it so as not to prevent the animal from lying down and obtaining needed rest. Mares are supposed to be much more subject to this vice than geldings or stallions; but so far as our personal experience goes, there is little difference. A broad leather strap, to which is tied a small wooden log, are commonly applied to one or both legs, but they are not always sufficient. A heavier weight than two pounds should not be used, for if a horse is frightened by it, he may kick worse and do himself injury. When, however, he is well used to a wooden log, and has got over his first alarm, a heavier one may be put on if required. The strap, which should be broad, is buckled around the leg above the fetlock, and the weight suspended from it, which should not reach farther down than an inch and a half above the coronet, as the coronet would inflame to a mischievous extent if bruised. Sometimes a weight is required for each leg, if the animal kicks at both stall posts. Occasionally, when all other remedies fail, the practice will cease when the animal be turned loose in a roomy box stall.

Reining Horses.—The habit of reining in horses very tightly finds less favor with many persons than it did. It is not easy to see in what way the habit originated. If a man has a load of anything to pull, he wishes to get his head as far forward as possible to pull with ease. But the horse is denied this. His head is reined back tightly, thereby making it much harder for him to pull the load. To our view, a horse looks better, and we know he feels better, when pursuing a natural, leisurely, swinging gait. It is as necessary for his head to oscillate in response to the motions of his body, as it is for a man's hands to do the same thing. A horse allowed his

head will work easier and last longer than one on which a check is used. Blinds are another popular absurdity in the use of horses. They collect dust, pound the eye, and are in every way a nuisance. A horse that cannot be driven with safety without them should be sold to a railroad grader. No colt should be broken to them. Animals fear noises they cannot see the cause of much more than those they can. We would dispense with tight reining and with blinds.

Colic in Horses.—This disease is caused by indigestion, over-feeding, or by giving cold water in large quantities, or by eating sour grain. If colic occurs from eating sour grain, one of the best remedies is a few lumps of charcoal. Pulverize it fine and pour on it about a quart of boiling water. When cool, strain off and give. If the above does not give relief, stimulants should be given, with a view to arouse the stomach and get relief from the fermented food which it contains. Purges are of no sort of use for the purpose of relieving an overloaded stomach, and therefore if inflammation is present, their use is positively injurious. The use of saleratus and turpentine, which is so popular an agent with horsemen, are not always the proper remedies. To make use of the former, being an anti-acid it is supposed to combine with the free acid in the digestive organs, and thus neutralize it, but if its use is persisted in, it will injure the mucous membrane of the stomach. Turpentine is a powerful irritant, and it should never be made use of except by those who understand its action, and neutralize it by mixing it with linseed oil. The following has been used with good results, and can be recommended as safe and efficacious: Sulphuric ether, 1 1-2 ounces; oil of pepperment, 2 ounces; water, 16 ounces. Mix and shake well before giving. If not relieved, give again in half an hour, and an injection composed of soap suds to be thrown into the rectum.

Dr. N. Rowe, of Chicago, gives the following as the best simple remedy for colic in a horse: If it is ordinary colic, or gripes without flatulence, give him a dose of whisky, say from two to four ounces, that being generally handy; or a strong dose of peppermint or spearmint tea, hot; but if a drug store is near, give from one to two ounces each of laudanum and spirits of nitre; repeat the dose in half an hour if necessary. If it is flatulent colic, the horse bloated with gas, give a teaspoonful of saleratus in half a pint of warm water, repeat it in ten minutes; if this does no good, give an ounce of turpentine in half a pint of linseed oil; or you may give half an ounce of chloral hydrate in half a pint of cold water. In addition to the above directions, in all cases give warm water injections, and let the horse remain quiet, allowing him to roll if he wants, to give friction to the belly, and give soft feed and rest afterward for a day or two.

The *Massachusetts Ploughman* recommends salt, and as this is known among housekeeepers as useful in colic, we give what the writer says: "Spread a teacupful of salt upon the back of the animal over the kidneys and loins, and keep it saturated from twenty to thirty minutes, or longer if necessary. If the attack is severe, drench with salt water. I have a valuable bull, weighing nineteen or twenty hundred pounds, which had a severe attack of colic a year ago last summer. I applied salt to his back as above, and it being difficult to drench, we put a wooden bit into his mouth, keeping it open about two inches, and spread salt upon his tongue, which, together with the salt upon his back, relieved him at once, and within a very short time equilibrium appeared fully restored. I have for several years past successfully applied this treatment to other animals in my herd."

An officer who commanded artillery during the late war used the following simple remedy for colic in horses, which he has tried with perfect success in hundreds of cases: Rub the horse well between the fore legs and around the girth with spirits of turpentine. Immediately relief follows.

Another remedy is the following: Take some good home-made soap, and make about half a gallon of warm soap suds; then take a quart bottle, fill it, and drench the horse. Sometimes as much as a half-gallon may be needed.

Bots.—The bot larvæ are liable to be found domiciled in the horse at any and at all times. It only does noticeable damage when the number accumulates in the passages, or when there is some disturbance in the digestion of the horse, when, it is said, it cuts through the membrane of the stomach, causing death to ensue. The bot-fly lays its eggs in the hair of the horse, about the flanks and front legs, where they get to the tongue, and from thence are swallowed and hatch in the stomach. They live a certain period of time and are discharged, to become flies again. Several doses are recommended to be given to dislodge the grub, but when it is doing no perceptible harm many horsemen prefer to let it alone rather than medicate the horse. But some remove them by giving powdered aloes, asafœtida, each one-fourth ounce; mix in hot water, and when cold add oil of turpentine, sulphuric ether, each one ounce. Give in linseed tea as a drench.

Another authority says: Bots in horses may be known by the animals occasionally nipping at their sides, and also by red pimples rising on the inner surface of the upper lip, which may be plainly seen by turning the lip up. The cure is effected by taking two quarts new milk, one quart of molasses, and giving the horse the whole amount. In fifteen minutes afterward give two quarts warm sage tea; thirty minutes after give one pint of currier's oil, or enough to operate as physic. The cure will be complete, as the milk and molasses cause the bots to let go, the tea puckers them up, and the oil carries them entirely away.

Another remedy is as follows: Give the animal one quart of sage tea, in which a large teaspoonful of soda or saleratus is dissolved. If not relieved in one hour, repeat the dose, and repeat hourly until relief is obtained.

Founder.—Founder consists of inflammation of the laminæ, or leaves of the hoof—the most sensitive portions of the foot, which serve to connect the interior part to the outer protecting covering of horn. It may be very severe and acute, or a simple stiffness of the limbs and muscles. In this case two drams of lobelia may be given, and the limbs bathed with hot water and rubbed with liniment or kerosene oil. This may be continued for three or four days. Warm blanketing, with hot fomentations, will be useful. When the horse suffers very much, and the feet are hot and painful, a pound of salts should be given, followed by twenty-drop doses of tincture of aconite; the feet enveloped in large poultices of bran, or even sawdust, steeped in hot water, and the legs bathed in hot water and wrapped up. A deep, soft bed should be given, and the horse induced to lie down. After the worst symptoms are over the hoof and sole should be rasped down and the feet kept in a puddle of clay and water. The shoes should be removed.

The following remedy, says an experienced farmer, of Texas, is a sure cure for founder, viz: "A large tablespoonful of pulverized alum and a tablespoonful of pulverized saltpetre mixed. Moisten the dose and administer it by pulling out the tongue and placing the spoon as far back in the mouth as possible."

Heaves.—If you want to have no trouble with heaves in your horses be sure that they are fed no dusty and dirty hay, which is the prolific source of this annoyance. Ordinary clean hay can always be fed with safety if properly cut up, moistened, and mixed with ground grain; but to feed the musty or dirty sorts is very injurious. Clover, owing to its liability to crumble, often gets dirty, even after storage, and should never be fed without being previously moistened.

Very bad cases of heaves have been cured by simply feeding the animal upon cut and moistened feed, of very good quality and in small quantities, three times a day. For instance, four pounds of timothy hay and three quarts of feed made of equal quantities of oats, corn, and wheat bran ground together. With this was mixed a small quantity of salt, and twice a week one dram of sulphate of iron and half an ounce of ground gentian root were given in the feed. A liberal bran mash every evening will also be very useful. A horse that cannot be cured by this treatment is of no value, and may be considered past cure.

The following is recommended by an agricultural authority: One dram of tincture of aromatic sulphuric acid in a pint of water night and morning, allowing the animal to drink from a bucket. The horse should also receive in his food, night and morning, equal parts of powdered ginger, gentian, sulphur, cream of tartar, charcoal, licorice, elecampane, caraway seed and balm of Gilead buds (chopped fine), the dose to be an ounce. Be careful and not overfeed the animal.

Still another remedy is the following: Asafœtida, pulverized, one ounce; camphor gum, pulverized, one-half ounce; mix and divide into four powders; feed one every other night for a week.

Epizootic in Horses.—The disease known as "the epizootic" is a common one, but is rarely so general as to be justly entitled to that distinction. It is simply a catarrhal affection of the bronchial tubes, the lining of the air-passages of the lungs, and the nasal sinuses, in fact, what may be called a very bad cold, with some fever. It is treated by a saline purgative, as 8 to 12 oz. of Epsom salts, and afterwards half an ounce of saltpetre daily, with warm drinks, general good nursing, and frequent rubbing of the limbs and body to excite the circulation.

Shying Horses.—A horseman whose horse is given to shying, ought never to permit himself to evince symptoms of nervousness nor punish the animal for exhibitions of timidity. Whenever a horse directs the points of his ears in a certain direction, as though distrustful or afraid, the reins should be pulled in another direction, thus diverting the attention of the animal from the object causing the perturbation. If, on the other hand, force or harsh means are used to compel an acquaintance with the object feared the horse will be doubly excited, if not unmanageable. We have found, in cases of shying or halting at real or fancied objects of disquiet, that stopping the horse and using soothing language, answers a very good purpose. If the object is stationary, the horse, after a short time, will most usually advance in the direction of it, approaching cautiously till satisfied no danger is to be apprehended, when he will resume his way in a quiet mood. But if chastised for shying, he will have two objects of fear instead of one, and become more confirmed in the habit of distrustfulness.

Best Material for Stable Floors.—A Western writer says: "I have used plank, macadam, cinders and coal-tar mixed, and clay pounded hard

for stable floor, but the best material for the purpose, and which gives me the most satisfaction, especially on the score of cleanliness, is good, hard brick, laid edgeways, with an inclination of about one-quarter of an inch to the foot; the more level the floor is, the easier it is for the horse. Many a horse has been ruined by standing on a stable floor with too much inclination. Persons making stable floors should study the comfort of their animals. Another great advantage of brick is, that it is always moist, which is an object to be taken into account, as the hoof never becomes dry, consequently there is no danger of contraction, providing the shoer leaves the frog alone, which should not be cut, not even the ragged edges of it. I have used the brick floor for the last three or four years, and am well satisfied that there is nothing better.

Scratches on Horses.—A veterinary authority says he has never known a failure of carrot poultice for scratches on horses, and he gives the following directions, probably valuable, as carrot has an excellent effect on many unhealthy sores: Wash the sores thoroughly with warm, soft water and castile soap, then rinse them off with clear water, after which rub dry with a cloth. Now grate some carrots (about a pint after grated) and bind them on the sores. The best way to bind it on is to take a cloth and wrap it around the sores, letting the lower edge come close down to the hoof; then tie a cord around this lower end, after which put the grated carrot into the opening at the top of the cloth, press it down around the sores, then tie another cord around the top of the cloth, a little above the fetlock. This should be repeated every day for four or five days, when the scratches will be cured.

Ringbones on Colts.—For ringbones on colts, first pay attention to shoeing. If he walks on the toe, have a high heel to the shoes; but if he strikes the heel first, let it be thin and the toe high. If there is inflammation, reduce it by rest and water bandages. Then blister with the following: Powdered cantharides, Venice turpentine, and rosin, each two ounces; lard, two pounds. Melt the last three together, and when not too hot stir in the cantharides. When the pustules appear, omit for a few days. Then apply again and alternate for three or four times. Remember that in all diseases or troubles of this kind there will be more or less fever, and attention should be given to the general health of the animal, even when no particular symptoms of illness are seen

Cure for Spavin and Ringbone.—Venice turpentine and Spanish flies, of each, two ounces; euphorbium and aqua ammonia, of each, one ounce; red precipitate, one half ounce; lard, one and a half pounds. Pulverize all, and put into the lard; simmer slowly over coals, not scorching or burning, and pour off, free of sediment. For ringbones, cut off the hair, and rub the ointment well into the lumps once in forty-eight hours. For spavins, once in twenty-four hours for three mornings. Wash well previous to each application with suds, rubbing over the place with a smooth stick, to squeeze out a thick, yellow matter. This has removed very large ringbones.

Treatment of Sick Horses.—The practice of forcing a horse to stand on his legs, or walk about, while laboring under an attack of colic, is most inhuman. The same remark is also applicable to the plan of exercising a horse during the time he is under the purgative action of a dose of physic. He should be moved gently about before the medicine commences to operate, but never after. Do those barbarians who knock the animal about while

enduring the pains of colic or when suffering the purgative action of medicine, ever think of what they are doing? If they were treated themselves on the same plan under similar circumstances, they would soon come to their senses regarding the management of the unfortunate animal which is placed under their charge.

A Muzzle for Biting Horses.—This dangerous habit is taught the horses by thoughtless owners or drivers by playing with them when colts, or teasing them when full grown. A sharp cut with a whip across the horse's nose when he bites may serve to break him from the habit; but when the case is worse and incurable, a muzzle for this purpose may be made of strips of light hoop iron or of leather. A band may be made to encircle the muzzle to which strips of leather or iron are fastened. At the bottom of the muzzle a round piece of leather should be fastened by rivets to keep the strips in their place.

How to Save Oats in Feeding.—A saving may be effected in the consumption of oats for horses by simply soaking them in tepid water. Practical experiments which have been made show that by this method the ration for each animal may be reduced by a third. Horses whose teeth have seen their best days masticate the grain in its ordinary condition insufficiently, and younger animals often eat so greedily that the greater proportion of it is swallowed whole. This waste may be obviated by the simple method recommended, which so far softens the grain that it is more completely masticated and digested, and consequently yields more nutriment. Three hours is a sufficient length of time to soak the grain, provided the water is not too cold.

How Blindness is Produced.—It is said that dark stables tend to produce blindness in animals. A veterinary surgeon says: "Darkness produces blindness, because nature is outraged in the fact that the sight of the eyes is destroyed by want of light to present objects properly to the vision, and thus, by continued inactivity, producing blindness. Even so is blindness, or imperfect vision, produced by an over-action of light upon the retina of the eye, as is always the case when light is admitted by a window directly in front of the horse. Nothing is worse than this light, so admitted. Nature is outraged, and as a penalty we have nervous, fretful horses, shyers, cribbers, balkers, runaways, and anything but a reliable and pleasant horse."

Care of Horses' Legs.—Few men who handle horses give proper attention to the feet and legs. Especially is this the case with the farmer. Much time is often spent in rubbing, brushing and smoothing the hair on the sides and hips, but the feet are not properly cared for. The feet of a horse require ten times as much, for in one respect they are almost the entire horse. All the grooming that can be done won't avail anything if the horse is forced to stand where his feet are filthy, for his feet will become disordered and then the legs will get badly out of fix, and with bad legs and feet there is not much hope for anything. In short, to those owning horses we would say attend to the feet and legs.

How to Tell a Horse's Age.—The editor of the *Southern Planter* says: The other day we met a gentleman from Alabama, who have us a piece of information as to ascertaining the age of a horse after it has passed the ninth year, which was quite new to us, and will be, we are sure, to most of our readers. It is this: After the horse is nine years old, a wrinkle comes in

the eyelid, at the upper corner of the lower lid, and every year thereafter he has one well-defined wrinkle for each year of his age over nine. If, for instance, a horse has three wrinkles, he is twelve; if four, thirteen. Add the number of wrinkles to nine, and you will always get at it. So says the gentleman; and he is confident it will never fail.

Sawdust for Stables.—Nothing makes so soft and easy a bed for our "dumb animals" as sawdust, more particularly the horse, as it is natural, before lying down, either by pawing or stepping back and forward, to brush all their bedding, if straw is used, under their hind feet, but would be less liable to move the sawdust. As regards injury to horses' feet or lungs on account of inhaling the dry dust, we know of a stable where horses are let, and I was informed by the owner that he had used sawdust for twelve years and never had been able to discover any bad effects from the use of it, and pointed out several horses that had been thus bedded for ten or twelve years; and had sold the manure at the usual rates, and never had heard of any objections on account of the sawdust.

The Watering of Horses.—M. P. Cartledge, member of the Royal College of Veterinary Surgeons, urges the great necessity of allowing an unlimited supply of water to horses; and he alludes to the very mistaken notion among grooms and others having the control of horses that water *ad libitum* is injurious. While grooms and others drink without stint themselves, they profess to know when a horse has drank sufficient, and so take away the pail before his natural wants are half satisfied. Horses will not drink to excess if watered frequently, and in their case drinking does no harm.

Cribbing.—Cribbing is a vice which springs from habit more than any other cause. It begins frequently from a desire to ease the teeth from inconvenience or perhaps pain, at that period when the dentition is perfecting, and then becomes fixed upon the horse as a vice. It is not injurious except when accompanied with "wind sucking," which is a series of deep inspirations by which flatulence and belly-ache are caused. When the habit is fixed on a horse it is difficult to break it, and the only effective method is to use a muzzle which prevents him from thus using his teeth.

Linseed Oil for Horses.—Linseed oil is not only a valuable restorative for sick horses, but is exceedingly useful in cases of inflammation of the membranes, peculiar to the organs of respiration and digestion; it shields and lubricates the same, tranquilizes the irritable state of the parts, and favors healthy action. Put a couple of handfuls of seed into a bucket and pour a gallon and a half of boiling water upon it; cover it up a short time, then add a couple of quarts of cold water, when it will be fit for use. In case of an irritating cough add some honey.

Windgalls or Puffs.—Windgalls are puffy swellings occurring along the tendons of the legs of horses, below the knee. They are the results of sprains or strains of the tendons, and are generally filled with synovial fluid, or lymph, or serum. A padded bandage, with astringent lotions applied two hours a day at first, adding two hours every day after, until it is kept on continually, is the usual remedy. Rest from work is helpful to a cure.

Brittle Feet.—Some horses have such brittle feet that it is difficult to keep their shoes on. This is often caused by a sudden change from exces-

sive and long-continued wetness to extreme dryness. The best treatment is to rub the soles and shells of the feet with a mixture composed of the following: Tar, two parts; beef suet, two parts; whale oil, four parts; beeswax and honey, one part each; melt over a slow fire, and mix well.

Ignorance in Shoeing.—Some blacksmiths who shoe horses do not know that the frog of the foot should be allowed to come to the ground; that it should not be pared down, as is frequently done, nor should it be touched when healthy. It is meant to pound upon the ground, and it is the pounding that it gets that is the life of the foot, and those horse-shoers who have not yet learned this very important fact ought to learn it or quit business. Most of the diseases and defects of horses' feet come from cutting away the frog or by raising it by high shoes clear away from the ground.

Avoiding Indigestion in Horses.—It is best to give a horse water before giving oats. The water stays in the stomach a very short time, but is quickly absorbed or passed into the bowels, where it is absorbed and goes into the blood. The horse secretes a very large quantity—more than four quarts—of saliva while eating a meal, which is sufficient to reduce the food to a pulp suitable for its digestion. So that to give water soon after eating, except in very small quantity, would be apt to cause indigestion and waste of the food by excessive dilution.

Flies and Horses.—A physician writing to the London *Daily News* recommends, to prevent the torment inflicted by the flies on horses, application to the latter, before harnessing, of a mixture of one part crude carbolic acid with six or more parts of olive oil. This should be rubbed lightly all over the animal with a rag, and applied more thickly to the interior of the ears and other parts most likely to be attacked.

To Cool Horses When Hot.—There is danger of congestion when cold water is thrown on the body of a horse when very hot and tired; and yet, how many do it? The better way is to throw water freely on the fore legs of the animal. This corresponds to the well-known custom of persons, when overheated, bathing the wrists for some time before drinking much.

To Recruit a Hide-Bound Horse.—To recruit a hide bound horse, give nitrate potassa (or saltpetre), four ounces; crude antimony, one ounce; sulphur, three ounces. Nitrate of potassa and antimony should be finely pulverized, then add the sulphur, and mix the whole well together. Dose, a tablespoonful of the mixture in a bran mash daily.

Sprains and Bruises in Horses.—Dissolve an ounce of camphor in eight ounces of spirits of wine; then add one ounce of spirits of turpentine, one ounce of spirits of sal ammonia, half an ounce of oil of origanum and a tablespoonful of laudanum. Rub in a quarter of an hour with the hand, four times a day.

Flies in Horse Stables.—It is said that kerosene oil slightly sprinkled on the floor of the horse stables will serve to abate the nuisance of flies. It may be shaken out of a bottle through a hole in the cork. A pint will last a week for the purpose.

Hemlock Cribs.—A horse will not bite a crib made of hemlock lumber, nor will rats, mice, or other vermin gnaw through it.

Worms in Horses.—Worms in horses are caused by hard work, poor food, and general neglect. For ordinary cases of worms, common salt, nutritious food, and pure water will prove satisfactory. Salt should always be kept in the stalls of horses.

Over-Reaching.—An over-reaching horse, one whose hind feet is frequently hitting the forward shoes, should wear heavy shoes forward and light ones behind. The theory is that the heavier hoof will be thrown a little farther ahead than the lighter one.

Worms in the Rectum.—When a horse is affected with worms in the rectum there should be injected in the rectum, once daily for a week, a mixture of one pint of linseed oil and two drams of oil of turpentine. Feed at the same time bran mashes and oil meal.

Sensitive Jaws.—Some horses are more sensitive than others in the upper jaw, and will not go up on the steel bar or snaffle upper-jaw bit. In such cases have a bit made of plain round leather, the usual size of the upper-jaw bit.

Best Method of Cleaning Horses.—The best thing to clean a horse with is a corn-cob scrubbing-brush. It never can scratch his legs, as the curry-comb of tin does, while it does more work in the same time than curry-comb and brush put together.

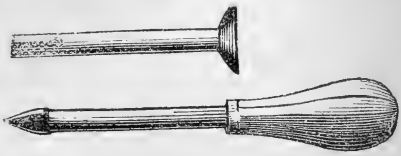
Hints to Breeders of Shorthorns.—To learn a trade, is to do things precisely upon the same principles, and up to the same general standard that experts in the same trade attain to. The principles are simple, though the parts are complicated. So of Shorthorn cattle. They are merely machines for converting crude grain or grass into bone, muscle, adipose matter, and hair; and the whole secret of excellence—the superiority of one beast over another—consists in their ability to convert the most crude food in a given time into the finest quality of the tissues named, so distributing these as to give us a roomy frame of bone in the parts where we want room for the vital organs and for the choicest cuts, and thick, fleshy, well-marbled roasts, and broad, well-marbled steaks, in the parts where best fiber is produced. Such a conformation should be secured as will answer these ends so effectively as the engine is expected to generate steam through the consumption of fuel in the furnace. The conformation of the trunk of the cow is a subject worthy of very careful study. The bony frame is of secondary importance, the vital organs within being of the first importance, and the size and vigor of these, if accompanied by a liberal distribution of cellular tissue throughout the system, ensures a rapid conversion of food into nutritive particles and the disposition of these in the various tissues. Large lungs, and large heart, stomach and liver give size and rotundity to the trunk and width to the bosom. A large stomach is of the utmost importance, because furnishing a large surface. From this the gastric juice issues, and when we consider the inner surface of the stomach, and the air cells of the lungs, we must prize an extended surface in those organs as highly as we do a large surface in a steam boiler if we expect great results. Two of the worse faults in the construction of a Shorthorn are the following, viz.: the ribs starting from the spine in a downward direction, giving a wedge shape to the upper third of the chest; the other is a long rib deficient at the lower end, causing a curve upward in the lower line immediately back of the fore leg. We doubt

if any other two defects are so hard to breed out as these. A drooping rump or low carriage forward may be brought up in one or two crosses, so that with after care they may not reappear; but the defects in the chest pointed out above depend upon deficient vital organs within. The re-organization and enlargement of the heart, lungs, stomach, and liver require many discreet crosses to accomplish. Passing from the chest backwards, we would call attention to the importance of the short ribs being long, and standing out horizontally from the spine, forming a level plane forward of the hips. This broad, level loin generally keeps company with a round, deep chest and is a point of excellence that should always be sought. The hind quarter that holds its width well back, carries a large amount of meat not represented in the quarter that narrows in rapidly from the hip back. A perfect symmetrically-organized frame, with the fleshy part so well distributed and packed as to make it difficult to tell where one portion of the carcass ceases and the next begins This is the goal to be aimed at. The third and last subject, "quality," we will treat very briefly. No intelligent breeder while striving to increase the depth and breadth of the carcass, loses sight of the equally important point, the texture of those parts of the animal that are to be consumed as human food. This idea of texture is never lost sight of by the fruit grower, and the excellencies which fix the value of the apple, viz., fair size, smooth surface, and tender, juicy meat, are the three things upon which we base our estimate of a Shorthorn. Now, the common notion is that all animals that handle mellow have high flavored, tender flesh. This is an erroneous idea, proved every day upon the butcher's block. We couple two animals together, expecting to secure well-fattened, ready feeders in the progeny they will generally transmit it. But if both the parents have dark, unsavory flesh, they and all their get, and all the progeny after for all time, will have the same, unless modified and improved by new crosses having light-colored, savory flesh.

Selecting Breeding Males.—The first object which any breeder of cattle or sheep must keep in view is that his stock must be healthy. In the selection of a male animal, therefore, the first things to be considered are the indications by which it may be possible to form a judgment as to his constitution. There can be no doubt that this is one of the important points of form or shape to which it is material for a breeder to look into in the selection of either a bull or ram. It is not enough to observe that they have wide breasts or bosoms, but the width which is noticed in looking at them from the front, should be continued along the brisket, which should show great fullness in the part under the elbows; it is also important that they should be thick through the region of the heart.

Another point to be carefully considered is the muscular system. Great muscular power is not only indicative of a good constitution and good health, but it has a merit in itself. Large muscles are the usual accompaniment of strength of constitution, and it also shows that when ready for the shambles there will be a good proportionate mixture of muscle and fat in the meat. In both bulls and rams a thick neck is proof of large muscles, and there can hardly be a greater fault in either animal than to have this wanting. Other indications of muscle will be more difficult to observe in sheep than in cattle. In a good bull there should be a full muscle on each side of the backbone, just behind the top of the shoulder blades. He should also have the muscles at the outside of the thigh full and extending nearly to the hough. A bull having these indications will seldom be found deficient in muscle.

Ringing a Bull.—We give an illustration of a plan for putting a ring through the nose of a bull worthy of the attention of stock-breeders. A ring is undoubtedly the safest mode of controlling the bull. Clamp rings having two knobs, which press into the nostrils, may be useful for occasional use, but a good stout copper ring should be put through the cartilage of the nose of every thoroughbred bull before he is four years old. This will last him for his lifetime, and whether tied up in the stable or out for exercise, it will effectually control him. The old-fashioned plan of inserting the rings was by burning a hole through the cartilage with a hot iron, but this was a cruel and difficult process. The plan suggested is to use a weapon styled a trochar, similar to the surgical instrument employed for "tapping" in case of dropsy, and for "hoove" in cows. It is a sharp-pointed, round dagger (the point three-sided), carrying a silver-plated shield reaching from the upper part of the point to the handle. The above illustration will further explain.



The sheath being on the dagger when the operation is performed, the whole is easily pushed through the nose, the sharp point of the dagger piercing the nostril with so little pain that one man can easily hold the head still. The dagger is then withdrawn, leaving the sheath in the hole. The ring is then inserted into the end of the sheath, which is slowly withdrawn, leaving the ring in place. This is then closed and fastened with a screw. These rings should be so well made that both the hinge and the screw should be perfectly smooth, and so fitting as to take a practiced eye to notice the joining.

The manner in which the operation is performed will be seen at a glance at the accompanying engraving.

The ring should turn freely round in the incision, which, having been made with a three-cornered cut, will be more sensitive against a pull than the smooth-burned hole. Indeed, it is sometimes necessary with the latter cruel operation to take the ring out after a time and resort again to burning, in order to make the cartilage sufficiently sensitive for the ring to be effective in managing the animal.

An Inexpensive Relish for Stock.—Stock men of large experience appreciate the need of salt for stock, and usually make such provision that animals under their care are daily provided with this relish. There are, however, many farmers who look upon salt as a luxury enjoyed by their stock when placed within reach, but not necessary to their thrift or comfort. Ob-

servation and experience have proven to those who have given most attention to the subject that cattle require for best results the salt they crave.

The French Government at one time commissioned a number of practical and scientific men to investigate the subject of salt as a relish for stock, and ascertain the quantity required for different animals. While only approximate figures could be arrived at in the numerous experiments made to settle this matter, a scale was fixed upon by this commission as the minimum daily allowances for the different animals in ordinary condition. In this a working ox or a milch cow is allowed two ounces of salt per diem. Repeated trials appeared to prove that the amount specified produced in milch cows the greatest flow of milk. Oxen fed the same amount presented sleek coats, while others receiving no salt were rough, mangy, and ill conditioned. The scale in question allowed for fattening stall-fed oxen, two and a half to four ounces of salt per day, and for fattening pigs, from one to two ounces. For sheep, from one-half ounce to two-thirds of an ounce was allowed. One ounce was set down as the daily portion for horses and mules.

The figures given above possess a practical value to feeders of stock, in that they represent the respective amounts best calculated to produce desirable results in the different animals named, and give an idea of the amount required by each kind. On small farms with few animals salt can be dealt out in small quantities each day, but where herds and flocks are numerous, salt boxes and troughs become a necessity, and are in any case a convenient and economical arrangement. These troughs or boxes ought, of course, to be in sheltered places and at points where animals can have daily access to them. Some should be placed at elevations to suit horses and cows, and others set within reach of sheep.

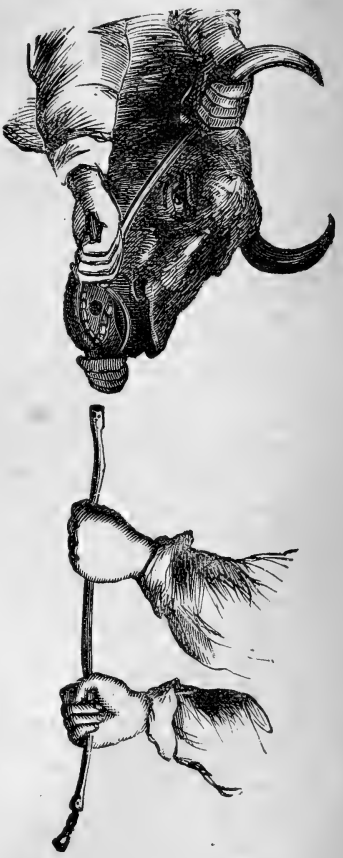
A plan in favor in the far West, and which recommends itself on the ground of economy, is mixing salt and hardwood ashes in equal proportions, combined with a sufficient amount of water to make a solid lump or mass. These lumps are distributed in the trough, where, with diligent licking, each animal gets a small quantity, the belief being that they will take in this form no more than they really require. In addition to the fact that salt is necessary to the thrift of animals, a strong argument in its favor in localities where cattle and sheep are allowed extended runs during the day, is that it proves a strong attraction, bringing them home at night without other incentive.

Cattle in Cornstalks.—A Kansas farmer writes: If cattle are allowed to run in stalk fields for an indefinite time they are apt to die from eating too much food of an indigestible character. Cornstalks when left standing in the field become woody and indigestible. Cattle when allowed to run, fill themselves so full that the stomach becomes clogged, the food heats, does not pass off, and the animal dies. For three winters I have fed my cows on shocked cornstalks, feeding no hay or straw, and in all cases they have done better than when fed on hay. In the winter of 1880 and 1881, I wintered 3,500 head of working oxen. I bought all the stalk fields that were accessible, allowed the cattle to run in them three hours each day, when I had them driven out. My reasons for so doing was not on account of smut, but because the stalks had become hard, woody and indigestible. I lost no cattle from this management, and returned them in the spring with a loss of only two to the hundred. Feeders have fed beef cattle for years on shock corn; they consider it the best and safest kind of feed.

Relieving Choked Cattle.—The accompanying engraving represents the instruments employed for relieving choked cattle, as recommended by Prof. Simonds, of the Royal Veterinary College of England.

"In cases of choking," says Prof. S., "the amount of danger may mostly be calculated by the abdominal distension, for death results from the lungs being unable to expand in consequence of the pressure of the rumen against the diaphragm."

He says: "In many cases prior to unchoking the patient, the gaseous compounds which are disengaged from the ingesta and distend the rumen, must be given an exit to, by puncturing the rumen, to prevent suffocation."



RELIEVING CHOKED CATTLE.

The instrument for unchoking, as shown in the sketch, consists of a probang and a gag; the latter is to be placed in the mouth as shown. Two assistants are required. One of these should be placed on either side of the animal, holding the handle of the gag, which protrudes from the side of the mouth, with one hand, and the opposite horn with the other. They must also keep the head elevated so as to bring it as near as possible in a straight line with the neck. We give Prof. Simonds's instructions in operating as follows:

"The probang being held as represented, is to be passed through the opening in the gag and carried carefully over the dorsum of the tongue into the pharynx, and from thence pushed inwards until it reaches the obstruction. Sufficient and well-regulated pressure is now to be made until the obstruction yields, when it is to be driven by the instrument into the rumen. Care should always be taken to *propel the root into the first stomach*, and we should never rely on the power of the esophagus to do this after we have succeeded in removing it from its original situation. Want of attention to this simple rule has often protracted suffering to the animal, and not unfrequently death. The probangs in ordinary use are seldom of sufficient length, nor are the bulbs with which they are tipped of a proper shape. The instrument should not be less than six and a half feet long, and the bulbs should be large and slightly cup-shaped."

Bone Disease in Milch Cows.—For more than half a century there have been occasional outbreaks of a peculiar disease in New England, mostly affecting milch cows, and commonly known as bone-ail or stifle joint lameness. Heretofore the trouble has been chiefly confined to hilly sections, but seems now to be approaching the valleys.

This disease, technically called *Cachexhia ossifraga*, is not confined to the stifle joint, frequently affecting the hip and other joints also. In one case, where the hip joint was affected, examination showed that the articular surface of the head of the tibia or shank bone had been worn through by its friction with the femur, or thigh bone, by the absorption of the floating cartilage between the ends of the bones. Similar conditions were noticed in other instances. As it is believed this cartilage cannot be regenerated, it was at first a question whether the disease was curable. Before investigation, its cause was attributed to the phosphatic materials in the feed, and this idea has been fully established. Where such materials were supplied in the form of bran, the disease was thought to be occasioned by the excessive use of such feed, as it was known that such excess changes the bone into a sort of phosphate, while the healthy bone is an insoluble phosphate.

In former outbreaks, bone meal was found to be an effective remedy, and in recent instances it has been used with good results. A Suffield, Conn., man, of considerable experience, says that two ounces of the meal in a pint of bran, three times a week during the early summer and fall feeding, will generally cure, if accompanied with plenty of salt. In aggravated cases, however, the free use of this material is recommended. Still, care must be exercised lest it should be supplied too freely, as an excess is sometimes liable to injure the butter, because the putrid, oily matter of the bone is excreted by the udder as a sort of oleomargarine. But if the meal has been thoroughly clarified, this trouble is less apt to occur, and it may be avoided altogether by the use of cotton-seed meal, which is rich in phosphates without containing the obnoxious matter liable to be in bone meal. Bran is also largely made up of phosphates, but it is well to add corn meal.

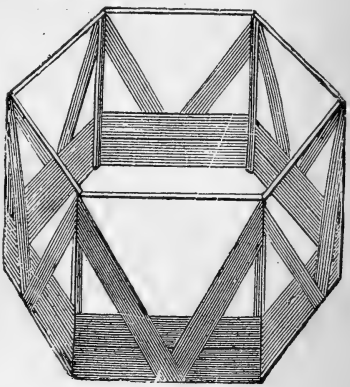
The necessary mineral element can probably be furnished in hay that has been manured with superphosphates, which furnish lime and phosphoric acid that are greedily taken in by the plant. Indeed, the recent outbreak is accounted for by the fact that where it occurs, little, if any, mineral fertilizers are used. They are now being applied more extensively, and the gradual disappearance of the disease will doubtless follow.

Marks of a Good Cow.—Those who keep but one or two cows naturally want them for general purposes, do not want a mere butter cow nor yet a mere milk animal, but one which combines both in as great a degree as can be found. Such cows are not plentiful, we admit, or at least are not often for sale at a moderate price, so that when they are offered, it behooves would-be purchasers to be able to tell them.

We do not believe in very small cows, nor yet in large, heavy animals, as neither, as a rule, are capable of filling the bill, the former too often falling short in the quantity, while the large ones are apt to run too much to flesh to make them profitable dairy animals. The medium-sized ones invariably produce the best results, and a heavy milker and a large butter maker is seldom fat, as the majority of the food she consumes is converted into milk and butter. The head should be fine but bony, with small horns, large, mealy nose and shapely ears. The base of the horns and the inside of the ears should be of a bright golden color. We have never yet seen an animal

with horns and ears well colored (golden yellow) which failed to make a fine quality of butter and highly colored. It is an unmistakable sign. The body should be of good size, and the width and depth rapidly increase as it runs to the rear or hind quarters. The milk veins should be large and prominent, and the udder need not necessarily be large, so it is not meaty, but is small when milked out. The teats should be of good size, and only have a single hole in each; we have seen quite a number with teats having two holes. The hair should be fine and soft, while the skin should be pliable, and almost as soft to touch as velvet or kid. In color it should be tinged deeply with yellow, especially on the shoulders and flank and along the back. Color of the hair is rather a secondary matter, though the best cows are generally yellow, tawn, gray or white, with dark marks edged with yellow. Black cows but seldom prove to be good general-purpose ones, though of course there are exceptions frequently met with.

Cattle Rack.—We give the following illustrated design for a rack to feed cattle from in the yard. We think it far superior in point of economy and convenience to anything of the kind we have seen. It can easily be made by anyone possessing ordinary skill in using tools.



CATTLE RACK.

The shape, as will be seen, is six sided, or in the form of a hexagon. It consists of six upright posts five feet long (3 by 4 scantling will answer, or round poles 3 or 4 inches through will do very well), and twelve boards, each one foot in width and five feet long. These latter nailed to the posts horizontally will form the box. To strengthen the whole and keep the cattle from stepping over the sides, nail strips of thick boards or plank flatwise across the upper end of the posts. Then nail two boards diagonally upon each side, extending from the top of the posts to the bottom of the box, leaving a space of about a foot and a half in the center on a line with the upper edge of the box. These slanting boards serve as braces, and give strength and firmness to the whole structure, and make six feeding places for the cattle. If scantling is used for posts, it would be well to hew off the corner from each, so as to make the boards fit well.

Mode of Construction.—Nail the boards to two sets of posts to form two opposite sides. Cut two strips of boards about ten feet four inches long; stand the side upright and nail these strips across the top and bottom—across the diameter—then bring the other ends within five feet, and nail on the boards across the end; you will then have three sides formed. Nail on the other two opposite sides and end. Put on the braces and it is done. It can be moved to different parts of the yard, and with care will last for years.

Economy in Feeding Cattle.—There is more waste in feeding than in anything else on the farm. Wheat straw, corn-stalks, and even chaff may be

fed, if properly prepared. With a fodder cutter that not only cuts but crushes, corn fodder can be made as palatable as clover hay, and wheat straw, when cut into short lengths and mixed with hay, answers excellently when grain is fed with it. Cows will always eat chaff if it is mixed with cut food. If all such feeding material as corn fodder and wheat straw is cut up fine, and well moistened, salted, and mixed with bran, shorts and meal, with a pound of linseed or cotton-seed meal additional, a mess will thus be prepared that is not only nourishing and healthy, but superior to hay alone. It is not intended here to recommend straw in the place of better food, but we claim that if a saving can be effected by feeding straw in connection with concentrated food, there will be a saving, not only of the hay in the loft by reason of the substitution, but also of much that annually goes to waste.

How wasteful it is to throw fodder and straw over the fence into the farm-yard to be picked over and trampled in the dirt without being consumed. Every pound of fodder and straw is valuable and can be put to useful service, which is very important when the winter's supply of hay seems unlikely to last, and when the cold season is unusually long. Nor is it proper to allow fodder to remain all the year stacked in the fields, for it is almost every time that the winds blow it down, where it remains until fed, but it is not then in as proper condition as if well cured and placed under cover. As to using straw for bedding, this, also, is wastefully done, as if it possessed no value; and if chaff is not preferred for feeding, let it be used as an absorbent in the stables, for which purpose nothing is superior to it. A crop of turnips, or what may be better, beets, parsnips, and carrots, should be grown for stock, not only for their value for feeding purposes, in proportion to their cost, but also because they afford a succulent diet in winter when every other kind of food is dry, and at times not relished.

How Good Cows are Ruined.—Milking is an art, and the farm hand who knows how to milk properly is more valuable to the careful dairyman than any other help. Of course, anybody can milk, and some can milk a dozen cows before breakfast. The careful manager, however, is not so anxious for fast help as he is to employ those who are careful. The operation should never be hurried, but the milk should be drawn steadily, and, as it flows, naturally. Some cows have very tender teats, and the rapid milkman forgets this fact in his endeavor to make speed. The cow that is naturally impatient and fretful does not like to submit to rough handling, and her disposition is soon ruined by such treatment. With the constant irritation she will fail in quantity, and be less productive, just as any human being would fail to perform faithful service when laboring under mental affliction or trouble. As the udder becomes distended and filled with milk, the desire on the part of the cow is to be relieved of its contents, and she willingly submits to it for the relief it occasions. The constant practice of being milked at stated intervals impresses itself strongly upon her, and she will seldom offer resistance without cause. When a cow, therefore, that has been a patient deliverer of milk becomes fractious, the fault can always be traced to the milkman. The careless dairyman is the one who complains of the failure of his cows to keep up the flow, and bloody milk, garget and other evils are the results of his own bad management. There is another point in the treatment of cows that demands attention, and that is allowing them to stand a long time waiting to be milked. With cows that give large yield it is very painful, and when the udders have been filled to their utmost, and the milkman is not on hand to relieve them, they become exceedingly nervous and restless. This

will do more to cause a cow to go dry before her period than anything else, and many a good cow has been sent to the shambles through diminution of quantity, simply because nature has revolted at her sufferings, and allowed her to dry up because her storehouse was not emptied of its contents at the proper times. She should also be milked to the last drop, if possible, and as the last portion of milk is claimed to be the richest, the udder should be left with nothing in it. With regularity in feeding and milking, and kind treatment at all times, the cow will not only become gentle, and remain so, but will milk on several weeks longer than otherwise. An experienced dairyman needs help that are skillful, and he knows how to judge the milkman's work by the behavior of his cows. When a stable of cows begin to give trouble in milking, it is only necessary to observe the manner in which they are milked in order to cure the evil. The udder of a cow is a very delicate structure, and she quickly rebels at rough usage or improper periods of milking.

TO PREVENT CATTLE FROM HOOKING FENCES.

To Prevent Cattle from Hooking Fences.—The mode herewith illustrated will be found a sure cure for cattle that hook or put their heads through fences. Take a one-eighth inch annealed wire ten inches long; make a ring in one end (one inch and a half); grind the other end sharp, to punch through the gristle in the nose. The animal's head has to be fastened securely in the stanchions, in order to bore the holes through the horns, which should be done with a three-eighth inch bit; then punch the wire through, and make the same sized ring in the sharp end; now take a cord that will run easily through the holes in the horns, and tie one end to the ring on one side and pass the cord through the holes in the horns to the other ring; the wire should be bent up above the nostrils to prevent the breath from rotting the cord; the cord should not be very tight when put on, for the rains will tighten it enough.

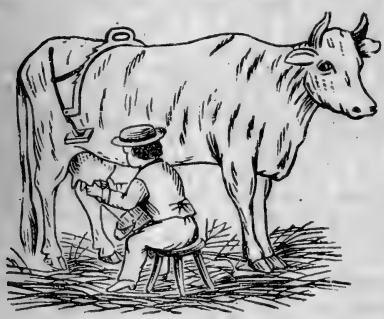
To keep a bull from jumping and hooking fence, put on the above and a poke with the sword or arm running through a wire ring in the nose, long enough to keep the arm from bearing on the wire, and the animal is at home all the time.

Currying Milch Cows.—To the farmer the idea of currying a cow, milch or otherwise, is an absurdity; but to dairymen who have highly-bred cows, who take a pride in their business and get the top price of the market for their produce, it is a matter of moment, in that it is known to increase the milk flow and the butter produce by ten to twenty per cent.

There are many points in the conduct of a dairy, unknown, indeed, unthought of by farmers, that will presently have a prominent place in their management, very much to the benefit of themselves and those who receive and make use of their produce.

Among those are: Succulent food, protection from inclement weather, kind handling, thorough and careful milking, full and regular feeding, clean stabling (when stabled), and an absence of foul odors, good ventilation, plenty of light and that thorough cleansing of the skin without which no milch cow can perform her duty thoroughly and well. With all these we must, to have a "tip top" article of butter, have the washing of the udder and teats before milking, and with this an entire absence of the filth accumulated in feeding and lounging between milkings.

Of all these, one of the most important is that of periodical currying, in that it cleanses the hide of superfluous hair, keeps it active and healthful and void of that peculiar odor so commonly found in milk and sometimes in butter. It promotes the secretion and disposition of the putrid particles of the animal system which would otherwise be absorbed by the secretery glands and be carried off in the milk, and leaves the latter not only purer but of a much better quality, and gives promise to the butter maker of a higher color and a purer flavor to the butter from the churn, hence a higher price in the market.



TO PREVENT COWS KICKING.

Herein may seem lots of trouble over details, but when reduced to a system they occupy little of time, labor or expense.

To Prevent Cows Kicking.—We give an illustration of a patented device for preventing a cow from kicking, which is said by those who have used it to be effectual. It consists of a light iron semi-circle intended to go over the back of the animal, with a joint and ratchet at the side, and a wooden block at each end, which fits to the flank of the cow, and prevents her from moving her foot forward. The inventor claims that it can be affixed in three or four seconds and that its operation is neither cruel nor harsh. On the contrary the habit has been entirely cured after it is used for a short time. It will doubtless suggest a modification that will be useful to farmers without infringing upon the patent.

Black Tongue in Cattle.—The symptoms are inflammation of the mouth, swelling of the head and face, discharge of bloody saliva, and high fever marks the first stages. Ulcers soon appear under and on the sides of the tongue. Then the throat and neck swell, and if the disease is not checked gangrene ensues and the animal dies. The disease is said to yield readily to early and proper treatment. The following has proved very successful: The animal should be bled from the neck vein. Give him castor oil, one pint, to be repeated in ten hours if it should not operate. Then use the following: Powdered burnt alum, four ounces; chloride of lime, two ounces; corn meal, two quarts. Mix, and with this powder swab the mouth frequently.

Lice on Cattle.—A correspondent of the *Country Gentleman* says on this subject: The more common remedies recommended for relieving cattle and stock from lice are more or less dangerous to life or health, and must be used with extreme care. An unfailing remedy which may be used by any one without danger to life or limb would be a boon to many farmers. Such a remedy we have in the bee-larkspur of our flower-gardens. A strong tea made from the seeds or foliage of the plant can be used as a wash with perfect safety. Any part of the plant may be used in making the wash, either green or dried. The plant should be gathered before it is frosted, and cured and preserved as other herbs are. In the use of kerosene, mercurial ointment, tobacco, etc., great care must be used or injury results from absorption; it enters the limbs or other parts of the animal and is often a permanent injury. No such danger need be apprehended in the use of larkspur. All the parts where the vermin lodge should be well scrubbed with the wash, and if thoroughly well done in a pleasant, mild day, one application is sufficient. In former days, when school children were troubled, I have heard old people tell their experience in using this remedy to their complete satisfaction. Another equally harmless remedy is aloes in fine powder, which may be used dry by filling a common pepper box with the powder and sprinkling it freely into the hair on the neck, back, sides and rump of the infested animal. Rub it thoroughly through the hair and on the skin with the ends of the fingers. Leave the animal undisturbed for a week, then card thoroughly and apply as before. Continue this at intervals of a week, till not a living parasite is left. Usually two applications, if thoroughly made, will suffice.

Another writer says that to destroy lice on live stock he has found nothing better than strong carbolic soapsuds. The soap usually sold under that name is not strong enough for the purpose. It may be easily prepared and at any degree of strength that may be required. Get a pound of carbolic acid crystals, which may be had at any wholesale druggist's. I get them in Boston at a cost of sixty cents per pound. Take ten pounds of common bar soap, put in a pan with a little water and heat until dissolved. Take out the cork from the bottle containing the acid, and set it in hot water, which will cause the acid to become fluid; add this to the soap and stir well. Set away to cool and you will have a soap at a small cost that will be strong enough to kill any vermin which infest domestic animals, and which will cure barn itch or any cutaneous diseases to which they are liable. It is good to cleanse and heal sores, and a wash of it will be found good where animals are hide-bound and the skin out of condition; it will be found good to wash the inside of poultry houses to render them sweet and kill and prevent vermin. It is a cheap, safe and sure remedy, and should find a place in all well regulated premises.

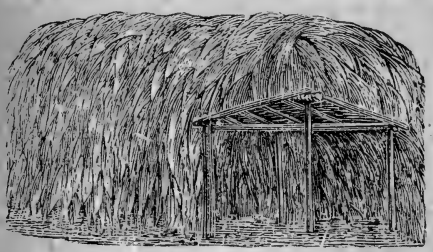
A stock-grower, writing to the New York club, gives his mode of destroying lice on cattle. He says: "I destroy them with brine—any kind of salt water will do it. I find two kinds of lice; the blue lice, and I think the other is hen lice. I tried red precipitate one year; it killed the lice, two yearlings, and a two-year old. But washing the cattle with brine is easier, and they get into the habit of licking one another, and are more gentle toward each other.

Another writer recommends grease. He says: "Insects breathe by means of small pores on their sides. Grease or oil that comes in contact with the insects closes the pores and stops the breathing. Mercurial ointment kills as much by the lard in it as by the mercury—that is, so far as the

vermin are concerned, but not as to the animals that lick it off from their bodies, so that almost any oily or greasy application will be destructive to insect vermin that infest animals if it is applied where it will do the most good."

Still another authority says: "A good remedy for lice on cattle is water in which potatoes were boiled. For every one of your cattle take two quarts of water and eight middle-sized potatoes cut in half. If you have ten cattle, you must take eighty potatoes and twenty quarts of water. When the potatoes are soft take them out. Get a large sponge and wash the cattle freely, choosing a warm day. Comb them with a currycomb, and you will be astonished to see the effects of the potato water."

Cheap Shelter for Stock.—Shelter for stock is one of the great needs of farmers. It is costly to build a barn and shed, but for simple purposes of shelter farmers might make greater use of their abundance of straw. In some localities it is customary to burn this as the readiest means to get it out of the way. A much better use might be made of it in constructing shelter for all kinds of stock, both against rain and cold. A very good plan is to make a frame of poles (as the engraving represents), and stack straw over them. This work should be done at threshing time, but if it has been neglected it may be done at any later time. It pays richly in health, thrift, and in the saving of food, to provide shelter.



CHEAP SHELTER FOR STOCK.

The Soiling System with Cows.—It is a question of economy as to whether it is wise in us to allow the herd the full occupancy of a pasture, in order to reap the products in the shape of butter and milk. A large herd requires a large pasture, and before any estimate can be made in the way of profit and loss, the value of the pasture itself, and the probability of what it may yield if cultivated, should be considered.

The soiling system, which demands that the cattle shall be fed at the barn instead of pasturing in the field, has many advocates, and the reasons in its favor are that fewer fences are required, more manure is saved, larger yields of milk and butter are procured, and less space is required. Those who oppose the method say that it requires extra labor, and that the health of the stock is improved by their having the liberty of the pasture.

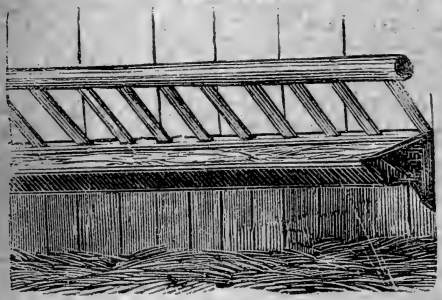
Every consideration should be made, however, regarding the conditions. If the stock is kept on farms that are too large for cultivation, and where space is no object, with an unlimited supply of grass that cannot be utilized except by being pastured, then the soiling system is not economical, for no necessity arises for its practice; but on small dairy farms, where land is valuable and the products within easy reach of the best markets, the system of stall feeding of cattle is one that should be carried to an extreme, for the result will be very profitable, any other method being suicidal in the extreme. The extra labor required is equalized by the saving in fences, and

the care and management is balanced by the savings of the liquid and solid manure. Both systems, therefore, are profitable under certain circumstances, the whole matter being regulated by soil, climate, capacity for production, and distance from market.

Raising Calves.—A stock grower writes: As a general rule, I let the calf suck the cow for three days, then I take it away; and after it has been twelve hours without food, I give it some new milk—about ten pounds, if I can get him to eat it. If, while the calf is running with the cow, you can handle it a little, so as to make it tame, it will learn to eat much easier. I am a large, stout man, and can easily hold a calf. If the calf is tame, so that it will come up to you and suck your hand, you can get it to eat the first time without much trouble; but if it is not tame, I get a-straddle of the calf, back him up in a corner, hold the pail between my knees, put one finger in the calf's mouth, and with the other hand hold the calf's head in the pail, and keep doing so until the calf commences to suck. Sometimes he will begin right off, and others will refuse for maybe ten minutes; but I never had one but what would suck after a while. By the third time I feed him I commence to take my finger out of his mouth, and do so more and more until he drinks without having a finger to suck. I feed entirely on new milk for ten days, then give about half new and half twelve-hours-old skimmed milk (using the cream I take off the milk on the table); then, after another ten days, I drop the new milk, having done so by degrees, and feed half twelve-hours-old skimmed milk and half skimmed milk. I work it so for a little while; but soon give him all skimmed milk, giving about eleven or twelve pounds at a feeding, and feed twice a day, without any meal or bran. I give in winter all the hay they want, keeping some before them all the time. After a calf is three months old you can give it some meal or shorts, if you wish; but I do not think it is best if it can have plenty of milk. I feed calves until about five months old, and then commence to wean them by degrees. If calves scour while they are being fed milk, I give them about two teaspoonfuls of salt. In the summer I feed them their milk cold, and it is generally thick, sour milk. In the winter I warm it a little, about milk-warm or blood-heat. It is well to handle your calves some while they are eating, so as to make them tame, and that is one advantage of raising them by hand, for they are generally tame.

Charcoal for Sick Animals.—In nine cases out of ten, when an animal is sick the digestion is wrong. Charcoal is the most efficient and rapid corrective. The hired man came in with the intelligence that one of the finest cows was very sick, and a kind neighbor proposed the usual drugs and poisons. The owner being ill and unable to examine the cow, concluded that the trouble came from over-eating, and ordered a teaspoonful of pulverized charcoal to be given in water. It was mixed, placed in a junk bottle, the head turned downward. In five minutes improvement was visible, and in a few hours the animal was in the pasture quietly grazing. Another instance of equal success occurred with a young heifer which had become badly bloated by eating green apples after a hard wind. The bloat was so severe that the sides were as hard as a barrel. The old remedy, saleratus, was tried for correcting the acidity. But the attempts at putting it down always raised coughing, and it did little good. Half a teaspoonful of fresh powdered charcoal was given. In six hours all the appearance of the bloat had gone, and the heifer was well.

How to Break a Heifer or a Vicious Cow to Milk.—A vicious cow becomes so only by education, or, as it is sometimes said, by being spoiled. The case is much worse than that of a heifer, and when the cow is apparently cured of a bad habit, it is liable upon slight provocation to return. The principle involved in the treatment of all brutes is to employ kindness together with the means of proper restraint. In the case of the young or the vicious cow, place her in stanchions or fasten her securely. Pass a girth—either a strap or a rope—around the body, just in front of the bag, letting it pass in the rear of the right hip and in front of the left. Draw the girth somewhat tightly—more or less so, to correspond with the severity of the case. Take pail and stool, and sit down to the milking. The case must be a very obstinate one which will give any lasting trouble. The philosophy of the treatment is that the strap so restrains the actions of the muscles of the hind legs that the animal cannot kick to harm, or get its foot into the pail, while the restraint is steady and sure and the punishment not severe. A woman or boy can manage an ordinary case. Heifers broken in this way, we think, become more thoroughly gentle and submissive. Of course an even temper and kind treatment must be strictly observed.



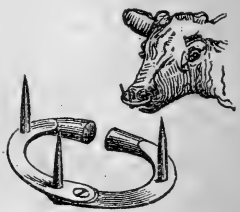
FEED RACK FOR STOCK.

Feed Rack for Stock.—The rack represented in this engraving is designed to be placed against a building or wall, under cover. It may be adapted to any kind of stock by placing it at the proper height. The cut plainly explains its construction. The trough below the slats may be used for feeding grain or roots. This style of rack is very popular in Europe.

Science Applied to Stock-Feeding.—It is often necessary to mix different kinds of food to secure the best combination of flesh and fat-producing elements. Experiments have been made in Germany to ascertain what is the proper combination of these principles. Ordinary food contains two leading elements, one of which supplies the flesh and muscle of the animal frame, and the other the fat and heat. These two elements should bear a certain relation to each other. In the combination producing the best results, the ratio is one of the muscle-producing to three or four of the fat-producing. Our common crop contains these elements in very different ratios. In corn-fodder it is 1 to 10, which is too small proportion of the muscle-producing element in proportion to the fat-producing. In wheat straw, they are 1 to 15; in oat straw, they are 1 to 16; in German millet, they are 1 to 3, so that this, when cut in the dough state, possesses the proper combination. In corn (grain) they are 1 to 7 or 8, too much of the fat for the muscle-producing elements. This corresponds to our experience. Corn is too heating for work stock in our climate in summer. It is, however, excellent for fattening animals. In oats (grain) these elements are 1 to 5, nearer correct

than in corn. In wheat bran, 2 to 8 1–2; in rye, 1 to 6. European field bean has 1 to 1.8 (one and eight-tenths), showing too much muscle-producing for the fat-producing elements. The proper medium may be attained by mixing two kinds of food. Thus corn and peas mixed make the ratio about correct. Clover hay is 1 to 3; lucerne, 1 to 2; vetch, 1 to a little more than 2.

How Practical Farmers Manage their Cattle.—A well-known firm of practical farmers give the following information of the method pursued by them: "Unless the weather is stormy, we turn our breeding bulls out for exercise half of every day, often with the cows in the pasture, when none of them are in heat. After breeding our cows we keep them in a stable, where they cannot be with the other cows for from ten to fifteen hours. We have a few stalls that are specially designed for cows that are due to calve during cold weather, and, of course, these are made as warm as we can get them. We turn the cows out with their calves three times each day, until the calves are six to eight weeks old, then only twice a day. We rarely allow calves to run with dam in pasture, though we put the calves out to grass as soon as they have learned to eat it. Feed young calves well on shelled corn, oats and meal. Have separate pastures for bulls and heifer calves and do not allow them to pasture together after the bulls are three or four months old. Our dry cows we winter principally on hay, feeding very little grain, except to young stock and those that have calves at their sides, or those designed for the show-ring. We breed our heifers when about twenty months old."



CALF WEANER.

Calf Weaner.—This invention relates to the class of calf weaners adapted to be attached to the central cartilage of the calf's nose, like a bull ring, the parts of the weaner being provided with sharp points that come against the cow's bag when the calf attempts to suck. The parts or sections of the device are attached together by a pivot forming a part of one of the points. They are held closed by means of a small screw. This device is very effective, simple and cheap.

Training Horns.—If it is desirable to straighten a horn, you may frequently scrape with a piece of glass, or a knife, the hollow side, which will cause it to grow faster on that side; but in that case it must not be scraped deeply, for then it becomes weaker on that side, and will be turned toward the weaker side. Some scrape the side toward which they wish to turn the horn quite thin, and then scrape the opposite side just enough to make it grow faster, and that will turn it toward the thinly scraped side. If you wish to turn a horn up, scrape on the under side just enough to make it grow faster on that side. A very barbarous way to turn a horn is sometimes practiced, by searing with a hot iron on that side toward which the horn is to be turned. This prevents the growth of horn on that side, and the growth upon the other side turns the horn. The horns may be polished by rubbing them with fine sand paper, and then with pumice-stone, and then oiling them. But this artificial manipulation of horns is seldom necessary. The horns of well-fed cattle will generally grow in comely shape if let alone.

The hair is sometimes oiled to give it a glossy appearance, but the best gloss is put upon the hair by rich and appropriate feeding. Nature, under proper conditions, does this work best.

Hollow Horn.—The first symptoms of the disease are readily seen. The animal affected refuses to eat, and shows an indisposition to move about. If not properly treated at once, the disease soon becomes so severe as to prevent the animal from feeding at all, and death is generally the result. The old plan of boring the horns and pouring in turpentine should never be resorted to, as it does no good, and gives the animal unnecessary pain. The horns are not effected, and consequently need no doctoring. The tongue is the member wherein lies the trouble. By securing the animal's head, so as to prevent injury to yourself from its horns, and then pulling out the tongue and pressing it downward, over the under lip, hundreds of little black heads of so-called flesh-worms will rise above the surface. Take a dull table knife and scrape off these black heads carefully and gently; then throw on the tongue a little salt or pepper, or both mixed together, which will bring up the saliva and set the animal's tongue to working. In a few hours at most the animal will begin to eat, and the trouble will be ended. We have never known this remedy to fail, no matter how severe the case.

Taste of Turnips in Milk.—There are several remedies, says the *American Agriculturist*, to prevent the taste of turnips in milk, but we believe no one of them can be strictly relied upon as effectual; we will, however, give them in order:

1. The objectionable taste comes from the crown of the turnip. If this is cut off and thrown away entire, the remainder will not affect the milk. 2. Dissolve a teaspoonful of carbonate of soda in a teacupful of warm water, and add this to six gallons of milk when first set in the pans. For a single gallon, of course one-sixth of the above would be sufficient, and for two or three gallons in due proportion. The turnips ought to be given to the cow immediately after milking. 3. Pulp or crush the turnips so fine as to make them quickly and easily digested after eating, and when fed mix with cut hay or straw. 4. Scald the milk as soon as drawn from the cows. The best way to do this is to insert the milk can into a large pan or kettle about three-quarters full of boiling water, and stir the milk until it reaches 80 to 90 degrees of heat, and then set it away to gradually cool off. The cream then rises thick, comes off in a lump, and is churned quickly. All the above remedies are so simple as to be easily tried, and if they do no good, cannot effect harm.

Leaves for Bedding.—An economical farmer writes: "In the scarcity of rye straw, and the absence of saw-dust and other material for bedding cattle, we have been forced to use forest leaves to keep the horse and cow in cleanly condition, and on the whole are much pleased with them. The gathering was from the roadside, and along the walls, where brush and leaves had accumulated for years. A few basketfuls were put under the animals every morning, and kept there until they were well saturated with the urine, and then thrown out into the manure heap. With a plenty of this material, kept dry under a shed, and used abundantly, there is very little loss of liquid manure. As an absorbent, it is much more effective than we expected to find it. Leaves have a high reputation as a material for the hot-bed and the compost heap, and are worth the labor of gathering, in most cases for their fertilizing properties. Cords of them are going to decay in the sight of almost every rural home, and it is the rare exception that they are utilized. Meanwhile the fields and garden are famished for want of manure, or supplied with concentrated fertilizers at forty dollars a ton.

The First Milk.—The custom of weaning the calf from the cow when it is only three days old is a barbarous one. We are familiar with the fact that cows are sometimes injured by such a course, also, especially if she is naturally of a nervous, anxious disposition, she soon learning the habit of holding up her milk, and when a cow holds up her milk she has become addicted to the most incurable vice known. There is another thing connected with the weaning of the calf at so early an age, which is the plain statement that we make in claiming that the milk is unfit for use, although the calf is usually taken away in order that the milk may be sold. Those who have had experience in the dairy know that milk from cows that have recently come in is ropy, and possesses a distinct characteristic in appearance from that of cows that have been in service for a longer time. Thus, it is not only unnatural to deprive the cow of her calf so early, but to use the milk. It also pays to keep the calf on the milk until it is old enough to be sold at a fair price.

Obstructed Teats.—The more the udder is stimulated to extra secretion of milk, so much the more is it liable to congestion and inflammation. The pressure, too, of a great quantity of milk in the udder upon the circular muscle (sphincter), which closes the end of the teat, tends to set up more or less irritation there, and this will sometimes result in excessive thickening of the walls and hard milking, or even complete closure of the orifice. The simplest and best treatment is to slightly dilate the opening of the teat, once or twice a day, with a perfectly smooth probe. A silver milking tube, about a twelfth of an inch in diameter, will answer; or, when this is not available, a probe of the same size made of gutta percha. A small size will be necessary at first, and, after a day or two, when that passes easily, a larger one, until finally the orifice is easily dilatable and the milking sufficiently free. In every case the probe should be well oiled, and introduced with caution, so as to avoid injury to the internal parts. A silver tube should be warmed before it is introduced.

To Test the Health of a Horse or Cow.—In horses the pulse at rest beats forty times, in an ox from fifty to fifty-five, and in sheep and pigs about seventy to eighty beats per minute. It may be felt wherever a big artery crosses a bone. For instance, it is generally examined in the horse on the cord which crosses over the bone of the lower jaw in front of its curved position, or in the bony ridge above the eye, and in cattle over the middle of the first rib, and in sheep by placing the hand on the left side, where the beating of the heart may be felt. Any material variations of the pulse from the figures given above may be considered as a sign of disease. If rapid, hard and full, it is an indication of high fever or inflammation; if rapid, small and weak, low fever, loss of blood or weakness. If slow, the possibilities point to brain disease, and if irregular, to heart troubles. This is one of the principal and sure tests of the health of an animal.

Black Leg.—Black leg in young cattle generally attacks calves in the fall when they get the rank growth of feed and are subject to sudden changes of weather from rains and frosts. It sometimes attacks thrifty calves in the winter when they are in the house and eating dry feed. We believe the herdsman can trace the disease back to the cause, and we believe the cause is the same in winter as in fall and spring; that is, rapid growth from generous feed and liability to sudden chills from being kept in too warm houses and exposures to cold while out during the day. Stables

should not be too warm, nor should calves be deprived of exercise. Saltpetre in salt is used by experienced herdsmen as a preventive; bleeding will prevent the disease spreading among calves; for, although it is not contagious, the cause that produces it in one is apt to produce it in others.

Treatment of Horn Brittleness.—In treating cows for horn brittleness, a stock raiser in Austria found no good resulting from feeding bone meal when the water used from a spring was perfectly soft—that is, without mineral matter. But upon changing them to the water of another spring containing carbonate, sulphate and phosphate of lime, and chlorate of magnesia in small quantities, the effects were as follows: 1. The animals drank half as much again as before. 2. The cows gave more and better milk than before. 3. The worst diseased cows at once began to get better, and this was the first case in which any of them recovered without removal. 4. The oxen showed far better condition than could be previously attained on the best of food and with the most careful attention. No fresh cases occurred as soon as the change of water was introduced.

Sores on Cattle.—There are many sores on cattle, which if kept constantly washed clean with cold water and kept free from dirt, would heal of themselves. A very careful herdsman says his practice of curing hoof-rot is to thoroughly cleanse the affected parts with warm water and soap; and then apply warm tar between the hoofs. In very bad cases there will be a large core to come out; remove it carefully with the thumb and finger, cleanse the cavity as above with soap and water, and then fill it with warm tar. Keep the parts thoroughly covered with tar, even if it is necessary to use a bandage. Keep the animal in a clean, dry pasture. It is no more liable to affect the whole system than any other ulcer. When once cured there is no danger of its appearing again unless from the same cause.

How to Milk a Cow.—The most economical way to milk a cow, all things considered, is to milk the two fore teats clean, leaving off with a pretty full stream, and then milk the hind ones down to a short stream, and, returning to the fore ones, milk them to the same condition, not touching the hind ones again. This will leave the teats empty, and the bag, too. It is a false notion that tugging away at the teats stimulates a cow to give more milk; but, on the contrary, emptying the bag as soon as possible yields more; then the cow can have the extra time to eat, which is a better stimulus than either. A slow milker is never tolerated in the dairy districts, and a "stripper" is an injury anywhere. The sooner a cow is milked, and all the organs connected with feeding, digestion, and secretion are left in their natural condition, the better it is for the cow.

Caked Udder.—When a cow's milk suddenly dries up and becomes clotted in the udder, it is probably due to garget or inflammation of the udder from some one of many causes. The udder is then hard or lumpy, and hot. A remedy is to give the cow at once eight or twelve ounces of Epsom salts, with half an ounce of saltpetre, repeating the latter in six hours. If the milk is difficult to draw, a solution of one ounce of carbonate of soda in a pint of water should be injected in the teats with a syringe, and then milked out. This will bring away the curded milk which, if left in, will make matters very much worse. If the cow is feverish, the saltpetre may be repeated for a day or two. To bathe the udder in cold water, rubbing and squeezing it gently for a considerable time, is useful.

Another remedy is to wash and rub thoroughly with water as hot as you can bear your hand. Then rub with a dry cloth. Then apply hog's lard, or what is better, grate good yellow carrot fine and simmer it in the lard to an ointment and apply and rub as above.

Cows Winter Themselves.—Many farmers are accustomed to dry off their cows early, milking them only about eight months. We think it improves the milking qualities of the cows to milk them ten months, but they should be well fed. We have a neighbor, who, ten years ago, found himself short of hay in the fall, and lamented that he should have to pay out nearly all of the product of his cows through the summer to purchase hay at high prices to winter them. He had a moderate amount of straw, and we suggested that the product of his cows from the first day of December, if well fed, would pay for all the corn and meal, middlings, etc., necessary to winter his cows in fine condition. He tried this, keeping account of purchases of feed and sales of butter, and found that the butter came out ten dollars ahead in the spring.

Cornstalks for Cattle.—A Maine farmer says: Farmers justly set a high value on well cured corn stalks, but some find a difficulty in getting their stock to eat them as cleanly as they wish. I have overcome this difficulty this winter by sprinkling them with hot brine. I withheld dry salt from the stock a while, also husks, and made a brine by putting salt into a watering pot and pouring on hot water; gave the husks a bountiful sprinkling and fed them the last thing at night, instead of feeding them in the morning, as formerly. I think if I had tried this plan years ago I should have saved a great amount of fodder that was thrown out and trodden under foot.

Foul Foot in a Cow.—Cows and horses are subject to a disease of the feet similar to scratches in horses. Diseased granulations, similar in appearance to the heart of a cauliflower, break out and excrete a thin acrid matter. The treatment should be, to dress the diseased part with caustics, such as powdered sulphate of copper (blue vitriol) or sulphate of zinc (white vitriol), rubbed up smoothly, with clean, sweet lard, and give the animal repeated doses of one ounce hyposulphite of soda, as an alterative. The soda should be given every other day for a week or ten days.

Kicking Cows.—A writer says he once had a very valuable heifer which was an exceedingly vicious kicker. To cure her of the habit, he put a common garden hoe end in front of her off hind leg, and behind and above the gambrel joint of the nigh hind leg. Then sitting down on the right to milk, he put the handle of the hoe well up under his arm and began milking. The heifer could not stir either hind leg, and after one week she could be milked safely without fettering, and proved to be a valuable and gentle animal.

Warm Water for Cows.—Warm water is an excellent thing for cows giving milk; it is as good as two or three quarts of meal a day; but if you mix meal and shorts with it cows must be allowanced, as they will drink too much—enough to diminish the flow of milk. The quantity will vary with the character of feed and the cow. A little good judgment is a nice thing here, as everywhere else.

Roots for Stock.—The value of roots for stock is not appreciated to the extent that it should be. In the rotation of crops in England turnips rank

high, and it is not uncommon for a farmer to devote from twenty to fifty acres to this crop. Cattle are kept there in fine condition in winter on raw turnips, and the latter also make excellent food for sheep. On rich land the crop produces very largely, and a comparatively small space is sufficient for ordinary wants.

Jumping Cattle.—To stop a cow or steer from jumping over fences nail a horseshoe on one forward foot. This prevents the hoof from spreading, and consequently renders the animal unable to spring. This is calculated to be very effectual.

Mixing Hay for Stock.—A mixture of one-third clover hay with timothy and redtop is recommended for any kind of stock. This mixture, it is said, will produce more milk, more growth, and more fat in stock than clear timothy and redtop.

Proportions of Food.—A milch cow, on the average, requires daily three per cent. of her weight in hay to keep her in health, an ox two per cent., or two and a half per cent. if working moderately. An ox fatting, five per cent. at first, and four and a half per cent. when half fat; sheep three and a half per cent. to keep in store order. If other food is substituted for hay, or a part of it, its comparative value as a nutriment must be ascertained. Thus, eight pounds of potatoes are equal to four pounds of good hay, while eight pounds of turnips are only equal to one and three-fifths pounds of hay.

Carrots for Stock.—It is asserted, by those who have tested the matter, that for stock-feeding an acre of carrots is worth about two hundred per cent. more than the same ground will do in grass. This will pay for increased expense of cultivation, and leave a fair margin of extra profit. Cattle take readily to carrots as a portion of their daily food, and the large yield per acre should make them a greater favorite with farmers than they generally are. The thinning and weeding appear to be a great drawback to their more general cultivation. But with this expense the crop pays well.

Celery Tops for Cows.—A writer in an Australian paper states that in many instances the leaves of celery are highly esteemed as food for milch cows, and are often preferred to red clover. The cows are said to eat them greedily, and to yield on this food a far richer milk than on any other. Sometimes leaves are cut up small, scalded with hot water, and given as a mash mixed with bran, and sometimes they are fed whole in their natural state along with the other ordinary food

The Best Feed for Cattle.—We have seen pumpkins fed quite freely with excellent result in quantity and quality of milk; but it is not fit or economical to feed too largely of any one food. Potatoes fed in moderation are excellent for milk; but given in too great a quantity they will reduce the yield. Turnips or beets must not be given too liberally; corn fodder, given as a sole ration, is unprofitable; but fed with half pasture will keep up the yield of milk and add largely to the profit of the season.

Phosphates for Cattle.—A natural instinct leads cattle to eat bones when their pastures are deficient in lime or phosphates of lime. If these bones are brought home and reduced to a fine powder, mixed with salt, and placed in a box or boxes fixed in the barn-yard, the cows will lick them and

derive very great benefit from them. This will save their teeth, and prevent them from choking themselves, as they might readily do with a piece of bone. Those who have no old bones should purchase a few, and treat them in the way indicated.

Straw and Bran.—Professor Henry, of the *Wisconsin Experimental Farm*, holds that it is wise economy on the part of the farmer who has a great straw stack, and small herd of cattle, and some hay, and who will not enlarge his herd, to sell the hay at $7 or $8 per ton, and spend the money in buying bran at $11 and $12, and feed it with the straw, together with some oil-meal. Good bright straw is made equal to hay by the addition of the protein in the bran and meal, and the whole is thus made into a far better quality of manure than usually comes from the usual way of feeding the hay, and half washing the straw.

Feeding Bran with Meal.—For winter feeding, where cattle are kept in stalls and heavily fed, there is no better divisor for corn meal than wheat bran. It is also cheap, and furnishes what the corn meal lacks. When cattle are fed on corn meal as the principal food for fattening, it is apt to clog if fed in too large quantities; hence, our best feeders are in the habit of using bran as the cheapest and best means for rendering the meal fed more digestible.

Rings on Cows' Horns.—The first ring appears when the bovine is two years of age, and sometimes before. The ring gradually increases during the third year, and is fully formed at three years; the second ring appears during the fourth year, and is complete at the end of the fifth year; after that one additional ring is formed each year. A cow with three rings is six years old; with four, seven years old. After nine or ten years the rings are no indication of the age.

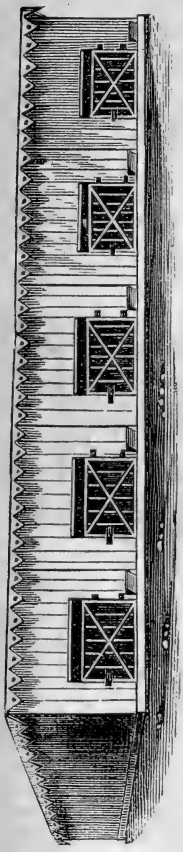
Care of Oxen.—Oxen that work on frozen roads, although there is no ice, should be shod. The rough, hard surface wears down the hoofs very fast, and causes inflammation of the interior; the trouble may not become apparent until later, when the mischief is difficult to repair. If the feet are tender and hot, and a slight lameness is perceived, examine the hoofs between the claws, cleanse the feet, and apply the needful remedies without delay, and so save trouble in the future.

To Exterminate Rats and Mice.—An English agricultural paper says: "Several correspondents write to announce the complete extirpation of rats and mice from their cow-stalls and piggeries since the adoption of this simple plan: A mixture of two parts of well-bruised common squills and three parts of finely chopped bacon is made into a stiff mass, with as much meal as may be required, and then baked into small cakes, which are put down for the rats to eat."

Garget in Cows.—It is said that eight drops of tincture of aconite dropped on a piece of bread and mixed with the food at night, and next morning four drops more given in the same manner, will generally complete the cure of garget in cows.

Scours in Calves.—For scours in calves, a raw egg broken into their milk is the most effectual remedy. A piece of rennet soaked in milk is also good, but we prefer the raw egg.

A Winter Piggery.—The object sought in the erection of this piggery is to secure a neat, clean, cheap and comfortable shelter for young pigs. The structure is thirty feet long, six feet wide, five and a half feet high in front, and four feet high at the rear. The roof slopes only one way, and projects fifteen inches, to throw water away from the pens. First make the spot on which it is to be built a foot higher than the natural surface, with stiff, good clay soil. Gravel must be put on this several inches deep. Set round white oak posts a few inches in the ground at every corner of each pen or division. Nail on, with double-ten nails, scantling, two by four inches. Board up with vertical boarding, one by twelve inches. Cover the roof of building with the same material, and make slatted divisions for the pens inside. Our illustration shows the trough into which slops and water are poured from the outside. These have a one-inch hole at one end, with peg to let off surplus water in cleaning. A piggery of this size will hold from ten to thirty, according to size and age. It should be built facing the south, so as to allow as much sunshine as possible to enter the doors. Whitewash the inner apartments for health; also the outside, which gives the structure a pleasant appearance. The ornamental verge board is sawed out of one-inch plank a foot wide, and a one-inch auger hole put through the center of the figure, as shown in the cut. The rafters project a foot over the front, which proves a solid basis upon which to nail the verge board. A little venetian red in some lime is good to color the verge board, the corners and doors. The doors are made of open slat-work, and are furnished with small chains for fastening, and strap hinges. This piggery can be built for about $35.

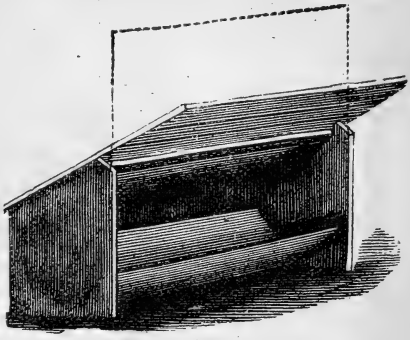


A WINTER PIGGERY.

Will it Pay to Steam Fodder?—Taking the word fodder in its broadest sense, says the *American Agriculturist*, as any kind of food for granivorous animals, we may say that it will always pay to steam or cook feed for swine, and often for cows, in stables containing twenty-five head or more, while for sheep and horses it will be of doubtful expediency, and usually not advisable under any circumstances. The cooking of feed for fattening swine is so important as a matter of economy, that it will pay, even though done with little regard to the saving of labor and fuel. On the other hand, to cook the feed for neat cattle with profit, not only should there be animals enough to make it pay, but the rations should be so carefully planned, that by mingling of palatable, with less relished and coarse fodder, a saving may be effected in that way. Besides the object for which the cattle are kept, is an important factor to be considered in the feeding.

The flow of milk is increased by steaming the fodder—the color of the butter is, however, injured. The same ration will prove more fattening, while, at the same time, there will be little or no waste, if the steam is well managed. It is best to have the steamed ration composed of a variety of feed, such as corn-fodder roots, hay or oat straw, with bran and corn meal, or cotton-seed, or linseed-cake, or meal. The substitution of one kind of fodder or meal for another, gives variety and relish. The coarse fodder is cooked soft, and the flavor of the roots and of the meal pervades the mass. It is not likely that any of the small agricultural steamers can be made to economically cook the food for as many as twenty-five or thirty head of cattle. When a boiler of several horse-power is employed to do other work, as pumping, thrashing, sawing wood, grinding, cutting hay and corn fodder, etc., steam may be economically used for cooking fodder. Of this there can be little doubt. The steam box in which the fodder is placed for cooking, if it is big enough, need not be filled oftener than twice a week, and if, as already intimated, every pains is taken in the operation to save in the items of labor and fuel, steaming fodder for cattle will be found profitable.

Convenient Trough.—This trough is designed more especially for an out-door or field trough for summer and fall use. It is very desirable with many to feed their swine outside of pens in those seasons, and every farmer is aware that it is almost a necessity to have the trough arranged to keep the swine away, both from the person who feeds them and from the receptacle into which their food is placed while the latter is being prepared. The trough which we illustrate is adapted very perfectly to this purpose. It may form part of the fence, so that the swine cannot come to the rear, from which side the food is placed in it, and the additional advantage is the shelter of both trough and animals from storms.



CONVENIENT TROUGH.

The cut requires little explanation. The cover is hung on pins and fastened by a hook and staple on the rear side to keep it down. When food is to be placed in the trough the hook is unfastened and the cover lifted up in the position shown by the dotted lines. By this movement the swine are completely shut away, and it is very convenient to place and mix their food. A slight effort brings the cover back to its place, and they can then "go in." Perhaps sheep feeders might take a useful hint from this plan.

Pig Raising.—We will suppose that the farmer has a litter of good, healthy pigs of good stock, one day old. He congratulates himself that, having escaped the dangers which are so thick at the critical period of farrowing, he will have no further trouble. The pigs are lively, and well developed; the mother shows no disposition to eat them, and is careful not to overlie them. There are still two dangers right before the pig raiser

into which he may ignorantly run—but which may be easily avoided—which have caused the death of pigs by the million. The first is overfeeding the sow with rich, heat-producing feed. I think there is no one cause that has occasioned so much loss as this. Make it an invariable rule to feed sparingly of corn for the first week. A failure to pay close attention to the matter of diet at this time will often result in fever, which dries up the milk, the insufficiency of which actually starves the pigs to death. When the result is not so bad as this, the sow loses appetite, runs down rapidly in flesh, and although the pigs live they do not thrive, and before weaning the mother is a skeleton. For the first week feed house slops and bran, with but one ear of corn at a feed, and then increase gradually, and by the end of the second week you can feed as heavily as you please. The second danger to young pigs is that they become diseased for want of exercise. It the sow is kept in a close pen and proves to be a good suckler, it is often the case that in two or three weeks the pigs get so fat as to die. Many a farmer, with a valuable litter of pigs shut up in a close pen, has seen them die one after the other until the litter disappeared, and yet he had no idea what was the matter. Lay it down, then, as a second rule in pig raising, that young pigs must have exercise.

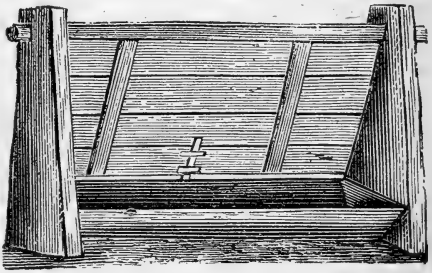
Still another important thing is a clean bed. If allowed to sleep in dust they are likely to die of thumps, and if in a wet place or a manure pile, they become mangy, or contract colds and die. But we will suppose that the farmer is wise enough to guard against the dangers I have spoken of, and has brought the litter safely to the age of four weeks, with the mother in good condition, and having a good appetite. It is now time to begin to prepare the pigs for weaning. Make a pen near where you feed the sow, and arrange it so that the pigs can go in and out at pleasure, but let it not be accessible to the sow, and begin feeding with milk and soaked corn. The quantity must be very small at first, and only what they will eat clean. Increase gradually, and by the time they are eight weeks old they will be eating enough so that they can be weaned without checking their growth. If, as is often the case, there are in the litter two or three pigs that are not quite up to the average, it will be good, both for them and the sows, to let them run with the mother a week or two longer than the remainder of the litter. For four months after weaning feed liberally. No matter whether your pigs are to be kept for breeders, fattened the first fall, or wintered over to be pastured the next summer and fed the second autumn, the treatment should be the same. Do not aim to make them fat, but get all the development of bone and muscle you can. The food should not be corn exclusively, for we want more of the flesh-formers, and they should have the run of pasture, and be fed on bran slop with the corn. Exercise, a varied diet, with part bulky food and not too much corn, will give a profitable hog.

Overfeeding Stock.—Overfeeding an animal is worse in its effects than a spare diet. A great many more young animals are checked in their growth, and otherwise injured, by overfeeding than by a deficiency of food. In illustration of this statement, a correspondent tells the following story of his own experience:

A rather opinionated and willful hired man, who requires the closest watching in feeding the stock, in defiance of strict orders, gave some Berkshire pigs some cotton seed meal in their feed, in the expectation that it would help them to grow. Their feed had been skimmed milk, with a quart of wheat middlings to the pailful. Considerable more cotton seed meal was

added to the feed during my absence from home for a day and night, and on my return the next day two of the young pigs were taken with convulsions and severe spasms. They died the next day, when two more were taken, and soon after two more. The whole six died in the same way. First they slowly turned around and around, then stood with the head in a corner and pressed against the wall or yard fence; the jaws were chopped together, and they foamed at the mouth. After a few hours they lay upon their sides and struggled violently with the legs until they died. A dose of lard oil allayed the symptoms for a time, and had it been given at first, would probably have saved them. On opening them the lungs were found congested and very red in patches, and the brain, also, was much congested, the blood vessels being dark blue. The stomach and intestines were filled with cotton seed meal, the milk having been digested. So short a case of indigestion, or stomach staggers, as it is popularly called, is rare; but the pigs were but two months old, and had probably been misfed previously.

A Convenient Feeding Trough.—We give an illustration of a convenient trough for feeding hogs or sheep. It is especially well designed for feeding hogs, and may be placed in the pen, the swing door above the trough forming one side. If desirable to use it out of doors, it may form part of a fence. The construction is simple. Two upright board standards, about four feet high, are nailed to the ends of the trough to support a swing door or partition, which is adjusted so that the lower edge plays back and forth just over the top of the trough. The view given is of the rear side of the trough, and the partition is swung forward to shut the animals away while their food is being prepared. When ready, the slide is withdrawn, the partition swings over the rear side, and the hogs can "go in." Slats of wood should be placed across the trough to keep the animals from standing in it. By swinging the partition high enough, the hogs may pass under.

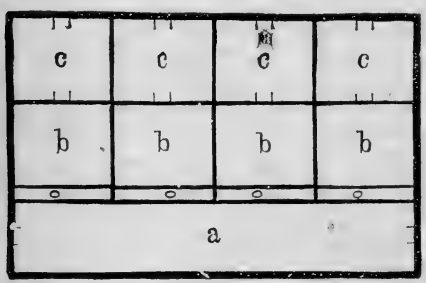


A CONVENIENT FEEDING TROUGH.

Sanitary Management of Swine.—One great fault in the management is to keep too many hogs together in one shed or inclosure. From want of proper protection in the way of housing, hogs are very apt to crowd together in bunches during cold weather; and, coming into the sheds wet and dirty, and being obliged to lie either on old and filthy straw bedding or on a wet and damp floor, their sweating and steaming soon produces a foul atmosphere, and the bedding, not being removed at proper intervals, gets rotten, and adds to contamination of the air. Being thus packed together in the building, the hogs, in a warm and perspiring condition, are next exposed to the influence of cold winds and wet, by being turned out in the morning hours to run in the field among grass wet with cold dew or from rain or hoar-frost, or to be fed from troughs in the yard. Among the common consequences are congestion, cold or catarrh, and, if the so-called hog cholera

happens to be prevailing, they are almost certain to be affected with that disease, as their systems, under such management, are rendered predisposed or susceptible thereto. In many places the hogs are kept in miserable sheds, no provision being made for proper drainage, the ground sloping toward the sheds, which frequently being unpaved, or without proper flooring, are constantly damp and wet, while pools of urine and filth abound, and with wind and sleet approaching from all quarters. In proportion as the standard of breeding has become higher, so has the vital force, energy, and hardiness become lessened; and the effects of improper quantity and quality of food, filthy or stagnant water, faulty construction of houses, and undue exposure to atmospheric influences, have become proportionately more baneful.

A Good Pig Sty.—We furnish herewith a plan for a good pig sty, with a detailed description showing the best manner of constructing the same. Our illustration represents the ground floor, 25 feet wide by 32 feet long. A is an entry five feet wide, running the whole length of the building, with a door at each end; it is used for feeding, as the troughs in boxes b, b, b, b, run along one side of it. The roof extends only over the entry (a) and the boxes b, b, b, b. The boxes c, c, c, c, are not under the roof. The whole building is floored with plank, with a slight depression in grade toward the front of about half an inch to the foot, for the purpose of drainage. The inside partitions need not be more than about four feet high. The small door between b and c is hung by hinges from the top, so as to open either way, made to work easy, not reaching quite to the floor. The pig soon learns to push it open and pass through, and the door closes after it. When pigs are put into the boxes, one corner of the box floor (c) should be made *wet*, and the pigs will be careful not to wet anywhere else. O, o, o, o, are feeding troughs. The height of the building should be seven or eight feet. No bedding is required. Keep the floor clean.



A GOOD PIG STY.

Hog Cholera.—The Lewistown *Gazette*, published in Fulton County, Ill., says: "Every paper in the United States ought occasionally to keep the fact before its readers that burnt corn is a certain and speedy cure for hog cholera. The best way is to make a pile of corn on the cobs, effectually scorch it, and then give the affected hogs free access to it. This remedy was discovered by E. E. Lock at the time his distillery in this county was burned, together with a large lot of store corn, which was so much injured as to be unfit for use, and was hauled out and greedily eaten by the hogs, several of which were dying daily. After the second day not a single hog was lost, and the disease was entirely conquered. The remedy has been tried in a number of cases since, and never failed."

The Washington (Iowa) *Gazette* says Mr. Donahey, of that place, furnishes the following recipe for the cure of hog cholera: To prevent hogs from hav-

ing cholera, quinsy, or pneumonia, use one gallon of soft soap, four ounces of saltpetre, and half a pound of copperas. Mix well in swill, and feed to about forty hogs in one day. In four or five days give the following: Carbolic acid, eight drams, black antimony, two ounces, half pound of sulphur. Mix well in swill, and feed to about forty hogs in two days. Repeat the above once a month, and it will prevent any of the above diseases. I have used it for ten years without a single case of any disease among my hogs.

A simple cure for hog cholera, says the *Kentucky Live Stock Record*, is an infusion of peach-tree leaves and small twigs in boiling water, given in their slop. Peach leaves are laxative, and they probably exert, to a moderate extent, a sedative influence over the nervous system. They have been used as a worm destroyer with reported success. They have also been recommended as an infusion for irritability of the bladder, in sick stomach and whooping cough. The cases of fatal poisoning from their use in children are on record, as peach leaves contain prussic or hydrocyanic acid, but as it is almost impossible to poison a hog, their use would not be objectionable. The specific is worth a trial.

The report of the Georgia Agricultural Department has a statement to the effect that forty cases of hog cholera were averted, if not cured, by turning the animals on to a quarter of an acre of clover, to graze for one week. It has long been held that this disease springs mainly from malnutrition, and too much feeding on corn or other carbonaceous food. The fact that clover —a nitrogenous fodder—in this case averted the threatened disease is of great interest. The culture and use of clover in the South may through this knowledge be greatly extended.

Nancy Agree, of Missouri, some years since claimed the $10,000 premium offered by the legislature of that State for a cure for hog cholera. Her specific is as follows: "Take inside bark of the wild cherry tree and boil it down with water so as to make a strong solution, and give it to the hogs to drink, excluding them from water. It has proven a perfect cure, even in the last stages of the disease. I also recommend an admixture of the root of the bull nettle."

A correspondent of the *Journal of Agriculture* recommends a half teaspoonful of carbolic acid in a gill of milk. This remedy, he states, has been successful in every case and not only cures but stops the spread of the disease. It is administered from the mouth of a long-necked bottle.

The Pig as a Plowman.—Farmers everywhere, says the *American Agriculturist*, are influenced by the construction of railroads and other means of quick transportation, but none of them more so than those who grow meat as a branch of their farm operations. The pork-raisers in the older States come in competition with the swine products of the prairie States, where the pig is a condenser of the corn crop, and among the most economical methods of sending that cereal to market—yet even with cheap freights, it will not do for Eastern farmers to abandon the sty, and look to the West for their salt pork and hams. There are economies to be practiced in swine raising that will make the Eastern farmer successful in his competition with the West. He has the protection of freights over long distances which can never be very much reduced. The home market will always be remunerative, so long as pork products are in demand. His lands need manure, and that which is made in the sty and under cover, is among the best of the home made fertilizers. Herding swine upon pasture, or old meadow, that needs breaking up, is not very much practiced, but is one of the best methods of

raising pigs. They are as easily confined within a movable fence as sheep, utilize the grass and coarse feed quite as well, and perform a work in stirring the soil that sheep cannot do. The nose of the pig is made for rooting, and we follow Nature's hint in giving him a chance to stir the soil. A movable yard, large enough to keep two pigs, can be made of stout inch boards, about fourteen feet long, and six inches wide. For the corner posts use two by four inch joists. Nail the boards to the posts six inches apart, making four lengths or panels four feet high. Fasten the corners with stout hooks and staples, and you have a pen or yard fourteen feet square, which is easily moved by two men. If you place two fifty-pound pigs into this yard they will consume nearly all the grass and other vegetation in it in three or four days, and thoroughly disturb the soil several inches in depth. When they have done their work satisfactorily, the pen can be moved to the adjoining plat, and so onward through the season. The advantages of this method are, that it utilizes the grass and other vegetation, destroys weeds and insects, mixes and fertilizes the surface of the soil about as well as the ordinary implements of tillage. In the movable yard there is thorough work. Even ferns and small brush are effectually destroyed. Worms and bugs are available food for the pig. And it is not the least of the benefits that the small stones, if they are in the soil, are brought to the surface, where they can be seen and removed. The pig's snout is the primitive plow and crowbar, ordained of old. No longer jewel this instrument, but put it where it will do the most good, in breaking up old sod ground, and help make cheap pork.

Charcoal for Hogs.—We have but little doubt that charcoal is one of the best known remedies for the disordered state into which hogs drill, usually having disordered bowels, all the time giving off the worst kind of evacuations. Probably the best form in which charcoal can be given is in the form of burnt corn—perhaps, because when given in other forms the hogs do not get enough. A distillery was burned in Illinois, about which a large number of hogs were kept. Cholera prevailed among these hogs somewhat extensively. In the burning of buildings a large amount of corn was consumed. To this burned and partially burned corn, the hogs had access at will, and the sick commenced recovering at once and a large portion of them got well. Many farmers have practiced feeding scorched corn, putting it into the stove or building a fire upon the ground, placing the ears of corn upon it, leaving them till pretty well charred. Hogs fed on still slops are liable to be attacked by irritation of the stomach and bowels, coming from too free generation of acid, from fermentation of food after eaten. Charcoal, whether it be produced by burning corn or wood, will neutralize the acid, in this way removing the irritating cause. The charcoal will be relished to the extent of getting rid of the acid, and beyond that it may not be. Hence it is well to let the wants of the hog be settled by the hog himself.

Iron Hog Troughs.—Upon the subject of the best material for hog troughs, a writer says: "I make them out of iron, not out of iron-wood, but cast iron. I grappled with this problem a half dozen years ago and mastered it. I became an inventor. I had an invention put into the form of a model and got the proprietor of an iron foundry to cast eight troughs after the model. They were put into the different pens and they are there now, bright, clean, smooth, sound, and all right, and I expect to leave them just in this shape to my heirs. The model cost $18, and the troughs 6 cents a

pound, and they weighed an average of at least 100 pounds. The spout is cast with the trough in one solid piece, and there are also feet cast and attached, by which it is fastened to the floor. The corners are made rounding and so is the bottom, so that freezing does not crack them, as the ice does not press against the corners or sides, but around the whole. They are easily cleaned out, as the sloping sides allow the dirt to slide out before a broom, are always in place, and will never wear out. The wear and waste and annoyance of modern troughs became unbearable. Now I contemplate this part of farm experience with a feeling akin to perfect satisfaction. The trough is not patented."

Phosphates Essential to Pigs.—Experiments made by Lehman upon young animals showed that food containing an insufficient amount of phosphates not only affects the formation of the skeleton, but has an essential influence upon its separate parts. A young pig was fed one hundred and twenty-six days upon potatoes alone; a result of this insufficient food, *rachitis* (rickets, or softening of the bone). Other pigs, from the same litter, fed upon potatoes, leach-out-meat, and additional phosphates, for the same length of time, had a normal skeleton; yet even in these animals there was a difference according to the kind of phosphate added. Two that were fed on phosphate of potash had porous bones, specifically lighter than the others, which were fed upon phosphate and carbonate of lime.

PIG SCRAPING TABLE.

Pig Scraping Table.—This table can easily be made by a handy man. It is formed by bars of wood fixed into a frame. By using a table of this description when scraping pigs, the water and hair fall to the ground, and the latter is effectually disposed of. It is a simple arrangement, and its construction and use will materially aid in neatness and despatch.

Preparing Food for Swine.—A writer gives the following opinion: "The present practice with the greater number, I believe, is to prepare food for pigs either by steeping, steaming, or boiling, under the belief that cooking in any shape is better than giving in the raw state. I am not at present prepared to say definitely what other kinds of food may do, raw or cooked, with pigs or other domesticated animals, or how the other animals would thrive with peas or corn, raw or boiled; but I now assert on the strongest possible grounds—by evidence indisputable, again and again proved by actual trials in various temperatures, with a variety of the same animals, variously conducted—that for fast and cheap production of pork, raw peas are fifty per cent. better than cooked peas or Indian corn in any shape."

Hogs as Producers of Manure.—One hog, kept to the age of one year, if furnished with suitable material, will convert a cartload per month into a fertilizer which will produce a good crop of corn. Twelve loads per year multiplied by the number of hogs usually kept by our farmers would make sufficient fertilizing substance to grow the corn used by them; or, in other words, the hog would pay in manure its keeping. In this way we can afford to make pork at low prices, but in no other way can it be done without loss to the farmer

Swine Raising.—The *American Agriculturist* contains the following sensible advice regarding the raising of swine: Pure air helps to make pure blood, which, in the course of nature, builds up healthful bodies. Out-of-door pigs would not show so well at the fairs, and would probably be passed over by judges and people who have been taught to admire only the fat and helpless things which get the prizes. Such pigs are well adapted to fill lard kegs, whereas the standard of perfection should be a pig which will make the most ham with the least waste of fat, the longest and deepest sides, with the most lean meat; it should have bone enough to allow it to stand up and help itself to food, and carry with it the evidence of healthy and natural development in all its parts. Pigs which run in a range or pasture have good appetites—the fresh air and exercise give them this—hence they will eat a great variety of food and much coarser than when confined in pens. Nothing need go to waste on the farm for lack of a market. They will consume all the refuse fruits, roots, pumpkins, and all kinds of vegetables, which will make them grow. By extending the root patch and planting the fodder corn thinner, so that nubbins will form on it, and by putting in a sweet variety, the number of pigs may be increased in proportion. A few bushels of corn at the end of the season will be ready the next year for any crop, and ten times the advantage accrue to the farm than if as the pigs are usually managed.

Bone Meal for Strengthening Hogs.—Most farmers have noticed that in fattening swine, especially when they are crowded rapidly, they always appear weak in their hind legs, and sometimes lose the use of them entirely. An intelligent farmer says that he and his neighbors have made a practice of feeding bone meal in such cases, and find that a small quantity mixed with the daily feed will prevent any weakness, and strengthen the animals so as to admit of the most rapid forcing. As bone meal is known to be a preventive of cripple ail and weakness in cows, it looks reasonable that it should also be a benefit to hogs, which are often confined to a diet containing but little bone-making material.

Keeping Hogs Clean.—The floor of a hog pen should be of plank. The pen and hogs can then be kept clean. If the animals are permitted to root up the floor of the pen and burrow in the earth, they will always be in an uncleanly and unwholesome condition, and much food will be wasted. It is quite unnecessary for either the comfort or health of the hogs to let them exercise their natural propensity to root in the ground. The exercise is really a waste of food and takes so much from their growth. Hogs will fatten most quickly when they eat and sleep and remain perfectly quiet, as they will do in a dry, warm pen, with a clean plank floor, and bedding of clean straw and plenty to eat.

How to Give a Pig Medicine.—At a recent meeting of an English Farmers' Club, Professor McBride spoke of the difficulty of administering medicine to a pig. He said: "To dose a pig, which you are sure to choke if you attempt to make him drink while squealing, halter him as you would for execution, and tie the rope end to a stake. He will pull back until the rope is tightly strained. When he has ceased his uproar, and begins to reflect, approach him, and between the back part of his jaws insert an old shoe, from which you have cut the toe leather. This he will at once begin to suck and chew. Through it pour your medicine and he will swallow any quantity you please."

Hay for Hogs.—Very few are aware of the fact that hay is very beneficial to hogs; but it is true, nevertheless. Hogs need rough food as well as horses, cattle or the human race. To prepare it you should have a cutting-box (or hay cutter), and the greener the hay the better. Cut the hay short and mix with bran, shorts or middlings, and feed as other food. Hogs soon learn to like it, and if soaked in swill or other slop food, it is highly relished by them. In winter use for hogs the same hay you feed to your horses, and you will find that, while it saves bran, shorts or other food, it puts on flesh as rapidly as anything that can be given them.

Paralysis in Pigs.—Pigs are frequently subject to a partial paralysis of the nerves of the lumbar region, by which motion of the hind quarters is rendered difficult or impossible. It sometimes results from inflammation of the covering membrane of the spinal cord, caused by exposure to cold. The remedy is to rub turpentine or mustard paste upon the loins, and to give a teaspoonful of saltpetre in the food once a day. Dry pens and protection from rains in the hot season are the best preventives.

Poisonous Swill.—A correspondent of the *Prairie Farmer*, having complained of a disease among his hogs, is told by another correspondent that the symptoms are similar to those of hogs of his own, which he is satisfied died from eating swill that had become poisoned by standing too long. He says: "Chemists say that when swill stands a certain length of time after it has soured, it becomes poisonous. I don't *know* that this is so, but I *do* know that I shall not feed any more old swill."

Roots for Hogs.—Parsnips, carrots, Swedish turnips, and especially mangel-wurtzels, will all fatten pigs. The roots ought not to be given in a raw state, but always cooked and mixed with beans, peas, Indian corn, oats, or barley, all of which must be ground into meal. When pigs are fed on such cooked food as we have stated, the pork acquires a peculiarly rich flavor, and is much esteemed, especially for family use.

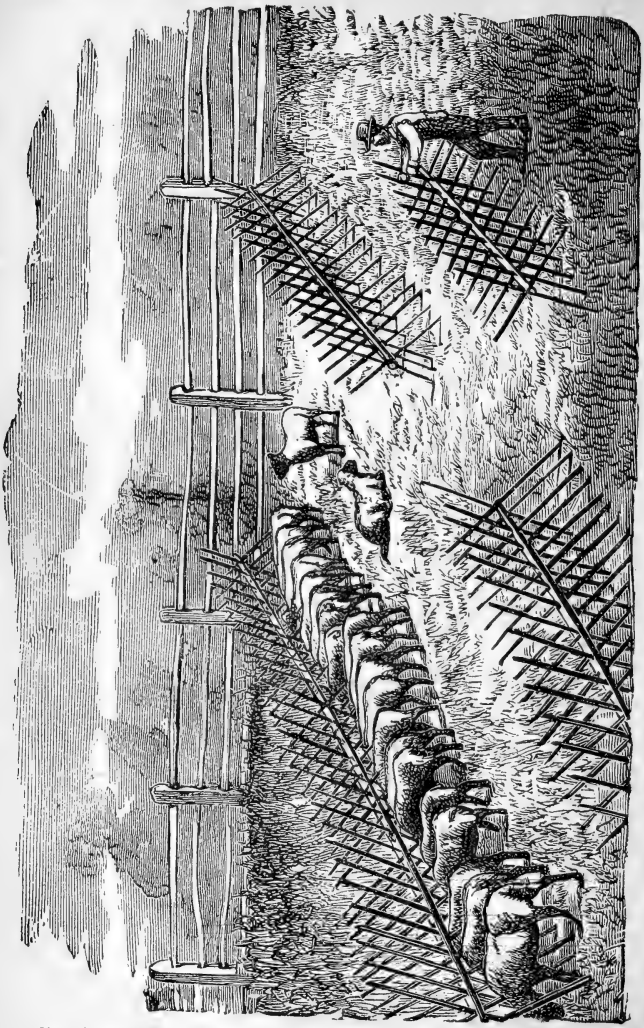
Economy in Hog Raising.—One man who let his hogs run on grass and artichokes all summer, was sure that his hogs paid him from fifty to sixty cents per bushel for the corn they consumed (not counting anything for the grass). Another man, who kept his hogs in a pen all summer without anything but corn and water, did not realize more than ten or fifteen cents per bushel for the corn consumed.

Water for Hogs.—Hogs require free access to water in the summer time. If they can have a place to bathe or wallow in, it is beneficial to them, as it cools and cleanses the skin. Mud is not filth—it is a good disinfectant and healthful. Sometimes mud baths have been found useful as medicinal treatment for sick people.

Scurvy Pig.—It is said by a farmer who has tried the experiment so often as to be sure of his ground, that buttermilk poured over the back of a scurvy pig will entirely and speedily remove the scurf. The remedy is simple.

Squash for Fattening Hogs.—A New York farmer declares that an acre of Hubbard squash will fatten ten more hogs than the corn that can be raised on the same ground. He has gathered from six to eight tons from an acre.

Hurdling Sheep.—The accompanying illustration shows how an Englishman fed his sheep on an irrigated pasture, by the use of hurdles of



AN ENGLISH METHOD OF HURDLING SHEEP.

a peculiar description. The hurdles are twelve feet long and are made with a stout pole bored with two series of holes twelves inches apart; stakes six feet long are put into these holes so that they project from them three feet

on each side of the pole. One series of holes is bored in a direction at right angles to that of the other, and when the stakes are all properly placed they form a hurdle, the end of which looks like the letter X. The engraving shows how these hurdles are made and the method of using them. A row of these hurdles is placed across the field. The field in which they are used consists of six acres. A strip of ten feet wide is thus set off, upon which four hundred sheep feed. They eat up all the grass upon this strip and that which they can reach by putting their heads through the hurdles. The hurdles are then turned over, exposing another strip of rather more than four feet wide at each turn. When this is fed off, the hurdles are again turned over. The sharp points presented by the hurdles prevents any trespassing upon the other side of them, and by using two rows of hurdles the sheep are kept in the narrow strip between them. Their droppings are very evenly spread over the field, and it is richly fertilized by them. At night the sheep are taken off and the grass is watered. The growth is one inch per day under this treatment, and when the field has been fed over, the sheep are brought back again to the starting point and commence once more eating their way along.

Raising Feed for Sheep.—The corn raised especially for sheep should be planted in drills, three and one-half feet apart, and about six inches in the drill. It will ear sufficiently, and should be shocked when the ear is just passing out of the milk, in large, well-built shocks. And the most profitable use that can be made of this for winter feeding is, to run it through a cutter, directly from the shock, reducing to fine chaff, stalks, ears, and all. If cut one-fourth of an inch long, the sheep will eat it all clean; this we know from practical experience. With a large cutter, a ton can be cut in twenty to thirty minutes. This cut corn, fed in properly constructed troughs, will furnish both grain and coarse fodder. The only improvement you can make on this ration, without cooking, is to feed with it some more nitrogenous food, such as bran, linseed meal, or cotton seed meal. Wool is a nitrogenous product, and corn is too fattening a ration when fed alone.

To Tell the Age of Sheep.—The books on sheep have seriously misled flock-masters on this subject. Almost any sheep owner will tell you that after a year the sheep gets a pair of broad teeth yearly; and if you show that his own three-year-olds have four pairs of broad teeth, he can only claim that they are exceptions, and protest that they do not exceed three years of age. Now these cases are no exception, for all well-bred sheep have a full mouth of front teeth at three years old. Some old, unimproved flocks may still be found in which the mouth is not full until nearly four years old, but fortunately these are now the exceptions, and should not be made the standard, as they so constantly are. In Cotswolds, Leicesters, Lincolns, South-Downs, Oxford-Downs, Hampshire-Downs, and even in the advanced Merinos, and in the grades of all of these dentition is completed from half a year to a year earlier. The milk or lamb teeth are easily distinguished from the permanent or broad teeth by their smaller size and by the thickness of the jaw bone around their fangs where the permanent teeth are still inclosed. As the lamb approaches a year old, the broad exposed part of the tooth becomes worn away, and narrow fangs projecting above the gums stand apart from each other, leaving wide intervals. This is even more marked after the first pair of permanent teeth have come up, overlap-

ping each other at their edges, and from this time onward the number of small milk teeth and of broad permanent teeth can usually be made out with ease. Another distinguishing feature is the yellow or dark coloration of the fangs of the milk teeth, while the exposed portions of the permanent teeth are white, clear, and pearly. The successive pairs of permanent teeth make their appearance through the gums in advanced breeds at about the following dates: The first pair at one year; the second pair at one year and a half; the third pair at two years and three months; the fourth and last pair at three years. It will be observed that between the appearance of the first two pairs there is an interval of six months, while after this each pair come up nine months after its predecessors. For backward grades, and the unimproved breeds, the eruption is about six months later for each pair of teeth, but even with them the mouth is full at three years and six months.

Sheep Ticks—How to Get Rid of Them.—Sheep ticks are much more numerous and more annoying than many suppose. Men of experience with large flocks generally know and apply the necessary remedies, but there are hundreds of farmers whose time and attention are principally directed to grain growing, etc., and who keep but a few sheep, whose flocks are sorely troubled by this parasite, and they never discover the cause of the evil. The accompanying engraving of the insect in its different stages, is from the Cyclopædia of Agriculture.

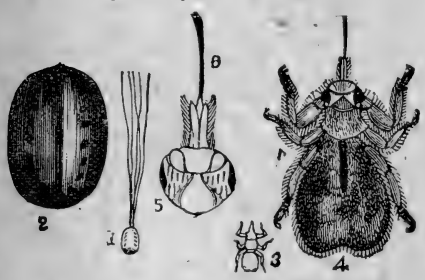


FIG. 1.—SHEEP TICKS, MAGNIFIED.

The sheep tick or louse lives amongst the wool, and is exceedingly annoying to lambs. Their oval, shining bodies, like the pips of small apples, and similar in color, may be found attached by the pointed end to the wool. (See engraving Fig. 1; Fig. 2, the same magnified.) These are not the eggs, but the pupæ, which are laid by the female, and are at first soft and white. From these issue the ticks (Fig. 3; Fig. 4, the same magnified), which are horny, bristly, and dull ochre; the head is orbicular, with two dark eyes (Fig. 5), and a rostrum in front, enclosing three fine curved tubes (Fig. 6), for piercing the skin and sucking the blood. The body is large, leathery, purse-shaped and whitish when alive, and notched at the apex. The six legs are stout, very bristly, and the feet are furnished with strong double claws. The English remedies are a wash of arsenic, soft soap and potash, decoction of tobacco, train oil with spirits of turpentine, and mercurial ointment.

Ticks, when very numerous, greatly annoy and enfeeble sheep, and should be kept out of the flock if possible. After shearing, the heat and cold, the rubbing and biting of the sheep, soon drive off the tick and it takes refuge in the long wool of the lamb. Wait a fortnight after shearing to allow all to make this transfer of residence; then boil refuse tobacco leaves until the decoction is strong enough to kill ticks beyond a peradventure. This may be readily tested by experiment. Five or six pounds of cheap plug to-

bacco may be made to answer for one hundred lambs. The decoction is poured into a deep, narrow dipping tank kept for this purpose, and which has an inclined shelf on one side covered with a wooden grate, as shown in our illustration below (Fig. 2). One man holds the lamb by the hind legs, another clasps the fore legs in one hand, and shuts the other about the nostrils to prevent the liquid entering them, and then the lamb is entirely immersed. It is immediately lifted out, laid on one side on the grate, and the water squeezed out of its wool. It is then turned over and squeezed on the other side. The grate conducts the fluid back into the box. If the lambs are annually dipped, ticks will never trouble a flock.

Early Lambs.—In many localities an early lamb will sell for more money than will the ewe and her fleece; therefore, where there is a market for early lambs the breeding of these is a very profitable business, if the person who attempts it is provided with ample shelter and understands the management of both ewes and lambs.

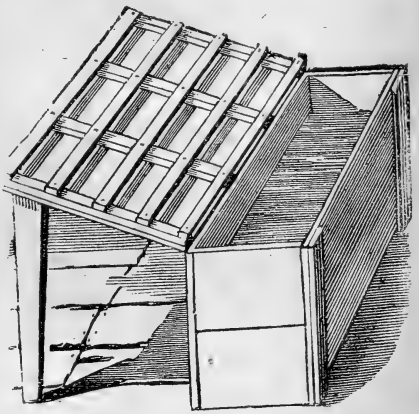


FIG. 2.—TANK FOR DIPPING SHEEP.

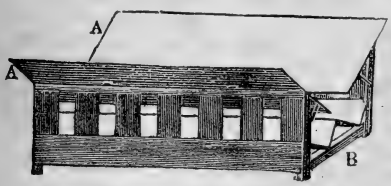
Lambs for early market are bred so as to be dropped in February and March. February is a hard month to bring them through, and without judicious treatment and warm shelter many lambs will be lost. The chief aim is to get the lambs ready for market as soon as possible, as it is the earliest arrivals that gain the highest prices. It is necessary to keep the dams in good condition with sufficient food to make plenty of nourishing milk. Experience and judgment are required in feeding the lambs; they must have food enough to promote rapid, healthy growth, and yet of a character that will not produce scouring. While the lambs are still with the ewes, it is well to supply them additional food. They can soon be taught to drink milk which is fresh and warm from the cow. Later on, oats, rye and wheat bran finely ground together make an excellent feed. As a gentle laxative a few ounces of linseed oil-cake will be found beneficial and at the same time nourishing.

As the lambs approach the period for weaning extra food should be increased; indeed, the weaning must be very gradually accomplished. The sudden removal of the lambs from their dams is injurious to both. A plan generally followed to avoid the evil effects of a sudden change, is that of removing the lambs to a good pasture of short, tender grass, and at night returning them to the fold with the ewes. The ewes must not be neglected. Their feed should be gradually diminished so as to diminish the yield of milk.

How to Make Sheep Pay.—Any farmer in the Eastern or Middle States having a farm of one hundred acres in good fence can keep a flock of

fifty sheep and receive larger profits than from any other investment of the same amount, providing they will care for them in the following manner, viz.: Have your sheep in good condition when you take them from pasture to winter. Have a sheltered pen, with plenty of room, to protect them from the cold and storms; have an out-yard where they can be allowed to go in on nice sunshiny days, in which throw cornstalks, oat or wheat straw, if you have plenty of it, for what the sheep do not eat will make manure, so there will be nothing lost. Also keep the sheltered pen dry, by throwing in straw, as fast as it is cut up in manure. Feed them on clover hay. If you do not grow any buy it, for one ton of clover hay is equal to two tons of any other for sheep, in my experience. Try and have your lambs dropped in January or February. Build a small pen alongside of your sheep pen, cut a small hole, so the lambs can get in, but not large enough to admit the sheep. Put troughs in the lambs' pen, and feed them on ground feed. They will soon find the hole and learn to eat, and if you have never tried it before, you will be surprised how much faster they will grow, and you will also find that the butcher will buy your lambs earlier, and pay a larger price for them than he will for your neighbor's, who does not observe the above advice.

Feed Rack for Sheep.—Feed racks for stocks are indispensable articles of furniture in the sheds and yards of the farm. We give an engraving of one of these, designed especially for sheep. Its dimensions are thirty inches high, twenty-eight wide, bottom formed by nailing together four boards, eight or nine inches wide, in the shape of two troughs, or the letter W, resting on the cross piece B. The novel feature, perhaps, is the cant boards A A, which are hinged and then fastened by movable braces. These boards serve as particular shelter to sheep, both from storm and chaff from fodder; and by moving the braces they assume a vertical position, and thus keep out the sheep while one is filling in the grain.



FEED RACK FOR SHEEP.

Why Sheep are Profitable.—Sheep are profitable for several reasons, among them being the small expense of maintaining a flock. By that we do not mean the plan pursued by many of turning them into the woods and fields to be called up occasionally to be "salted," but they cost but little when cared for, because they are not choice in the matter of feeding. They greedily devour much that would be unserviceable, and for that reason are a necessary adjunct on a farm as a measure of economy. Where they become serviceable mostly is on those pastures that are deficient in long grass, and which are not used for making hay. It is on this short grass, even if scattering, that the sheep pick up good feeding and thrive well. In fact, long grass is not acceptable to sheep, as they graze close to the ground. A flock of sheep would almost starve in a field of tall clover, and will quickly leave such for the privilege of feeding on the short herbage that grows in the fence corners, in the abandoned meadows, and among the wheat stubble. The crab grass, which becomes a weed on light soils, is highly relished by sheep when just beginning to spread out, and even the purslane is kept down by

them. Fields from which the corn has been harvested afford them much valuable pasturage, and they are always able to derive something for food on places that would support no other animal. In saying this it is not inferred that they require no care at the barn. They surely do, but require less than may be supposed.

They are also great renovators of the soil, scattering manure evenly and pressing it in, thus improving the ground on which they feed. They multiply rapidly, a small flock soon becoming a large one, and they produce profit in three directions—wool, mutton and lambs.

Tar the Noses of Sheep.—The months of July and August are the ones when sheep in many localities are subject to a most aggravating annoyance from a fly (*oestrus bovis*), which seems bound to deposit its larvæ in the nostrils. It infects wooded districts and shady places where the sheep resort for shelter, and by its ceaseless attempts to enter the nose makes the poor creature almost frantic. If but one fly is in a flock they all become agitated and alarmed. They will assemble in groups, holding their heads close together and their noses to the ground. As they hear the buzzing of the little pest going from one to another, they will crowd their muzzles into the loose dirt, made by their stamping, to protect themselves, and as the pest succeeds in entering the nose of a victim, it will start on a run, followed by the whole flock, to find a retreat from its enemy, throwing its head from side to side, as if in the greatest agony, while the oestrus, having gained his lodging place, assiduously deposits its larvæ in the inner margin of the nose. Here, aided by warmth and moisture, the eggs quickly hatch into a small maggot, which carrying out its instincts, begins to crawl up into the nose through a crooked opening in the bone. The annoyance is fearful and maddening, as it works its way up into the head and cavities.

The best known remedy is tar, in which is mixed a small amount of crude carbolic acid. If the scent of the acid does not keep the fly away he gets entangled in the tar, which is kept soft by the heat of the animal. Any kind of tar or turpentine is useful for this purpose, and greatly promotes the comfort of the sheep, and prevents the ravages of the bot in the head.

Increasing the Growth of Wool.—The use of chloride of potassium is recommended in Germany as a means of increasing the growth of wool on sheep. Some German chemists have made experiments with the article, proving that the growth of wool is promoted by its use. It is administered in the proportion of one part of chloride to nine parts of salt. It not only increases the production of wool, but improves the quality, and promotes the general health of the animal, we are told; but the proper quantities to administer are not stated.

To Cure Poisoned Sheep.—Take rue leaves, as many as you can grasp between thumb and forefinger. Bruise them; squeeze the juice into a half teacup of water, and drench the sheep with it. If the sheep are poisoned very bad, drench the second time, which will never fail to cure.

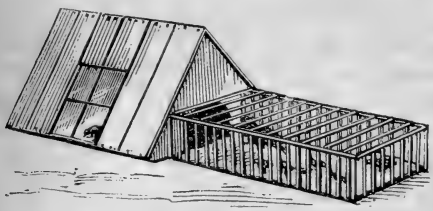
Crossing Merino on Common Sheep.—A Merino ram crossed on a flock of common sheep will double the yield of wool through the first cross alone, thus paying for himself the first season.

THE POULTRY YARD.

A Poultry House for Chickens.—The poultry house we have illustrated is designed for young chicks. It can be attached to a coop, and is made of laths. It is the length of a lath and half a lath in height.

Such an arrangement allows the mother some room to move about, and enables the young chicks to reach air and sun. Almost any bright boy can nail the laths together, and it will materially increase the chickens' chances of life. Remember that the first few days are the most critical and require extra attention.

More fowls are destroyed in infancy, like humans, by injudicious feeding than at any other time. The first four weeks' management of the young chicks is everything, for no after cares can compensate for neglect during the critical period. For the first twenty-four hours no food should be given the chicks of any kind. At first there may be given hard-boiled egg, chopped fine. This need only be given for two or three days when the food should be changed to one consisting of oatmeal cooked in milk, to which an egg has been added. The second week the milk and oatmeal gruel, stiffly made, should be continued, and good wheat screenings allowed also. After the second week the food may be varied so as to consist of anything they will eat, but do not confine them to a single article of diet, as disease of the bowels may occur. Green grass, cooked vegetables and milk may be given freely. The chicks should not be allowed to roam outside with the hen, if possible, until the sun is well up, as dampness is more injurious to them than cold. When very young feed every two hours, as feathers, bone and meat are forming fast, requiring plenty of nourishment. When cleanliness is observed but few diseases appear. Never let a surplus of food remain after the feeding is over, but see that they are sufficiently supplied before taking the excess away. Young chicks are not troublesome to raise if a little system and care are practiced.

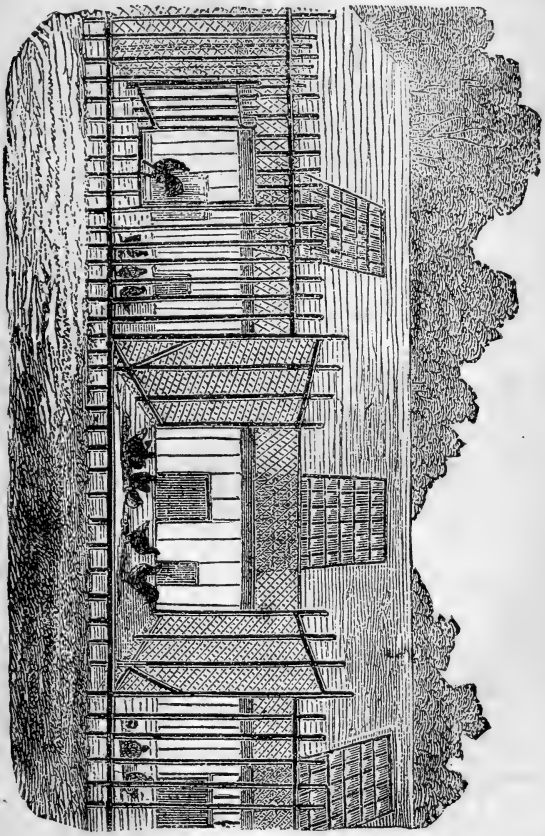


A POULTRY HOUSE FOR CHICKS.

A Model Hennery.—The breeding of new and choice varieties of poultry has grown to be quite an extensive industry in this country during the past few years, and it is not entirely confined to those who make it a business, either, as many of our farmers have learned, at last, that it pays to devote more time and attention to the raising and care of poultry than they formerly were willing to give to it. The model hennery herewith illustrated and described combines all the essential requisites for convenience, cleanliness, the

health of the fowls, and the separation of the different varieties, together with all the modern improvements, from which many good hints may be obtained, if not wishing to adopt the plan just as it stands.

This building is nearly 75 feet long, 13 feet high, and 12 feet wide. It is built of wood, the roof shingled. To the highest pitch of the roof it is 13



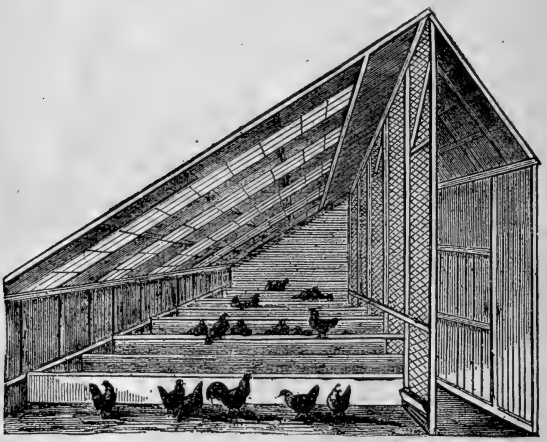
A MODEL HENNERY.—ELEVATION.

feet. The elevation or height from the ground or foundation in front is 4 feet, which cuts a twelve-foot board into three pieces; the length or pitch of the roof in front is 12 feet—just the length of a board, saving a few inches of a ragged end; the pitch of the rear roof is 6 feet, and the height of the building from the ground to the base of the roof is just 6 feet, which cuts a twelve-foot board into two pieces. The ground plan and frame work are planned on the same principles of economy of timber. By this plan no timber is

wasted, as it all cuts out clean; there is also a great saving of labor. The foundation of the building rests on cedar posts set four feet into the ground.

This house contains eight pens, each one of which will accommodate from twenty-five to thirty fowls; each pen is nine feet long and eight feet wide. All the pens are divided off by wire partitions of one inch mesh. Each pen has a glass window on the southern front of the house, extending from the gutter to within one foot of the apex of the roof, fixed in permanently with French glass lapping over each other, after the fashion of hot-bed sashes; they are about eleven by three feet. Each pen is entered by a wire door six feet high, from the hallway, which is three feet wide; and these doors are carefully fastened with a brass padlock.

The house is put together with matched boards, and the grooves of the boards are filled in with white lead and then driven together, so as to make the joints impervious to cold or wet. On the rear side of the house there are



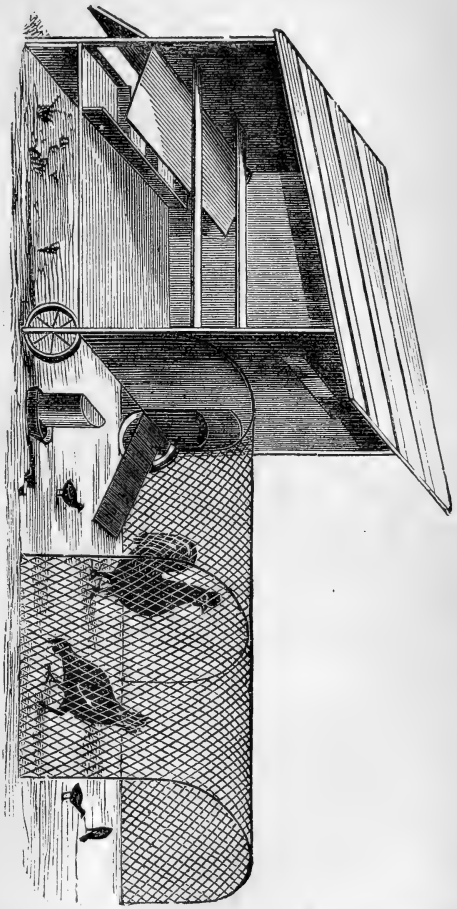
A MODEL HENNERY.—END VIEW OF INTERIOR.

four scuttles or ventilators, two by two feet, placed equidistant from each other, and to these are attached iron rods which fit into a slide with a screw, so that they can be raised to any height. These are raised, according to the weather, every morning, to let off the foul air. Each pen has a ventilator besides the trap door at the bottom, same size, which communicates with the pens and runs. These lower ventilators are used only in very hot weather, to allow a free circulation through the building, and in summer each pen is shaded from the extreme rays of the sun by thick shades fastened upon the inside, so that the inside of the house is cooler than the outside.

The dropping boards extend the whole width of the pen, and are about two feet wide and sixteen inches from the floor; the roosts are about seven inches above and over this board. They are three inches wide and crescent-shaped on top, so that the fowls can rest a considerable portion of their bodies on the perches. Under these dropping boards are the nest boxes, where the fowls lay, and are shaded and secluded. The feeding and drink-

ing troughs are made of galvanized iron, and hung with hooks on eyes, so that they can be easily removed when they require cleaning.

One can stand at one end of this long house and see all the chickens on their roosts. By seeing each other in this way the fowls are made companionable and are saved many a ferocious fight; at the same time each kind is kept separate from the other. Each pen has a run 33 by 12 and 15 feet; these runs are separated by wire fences 12 feet high, with meshes of 2 inches.



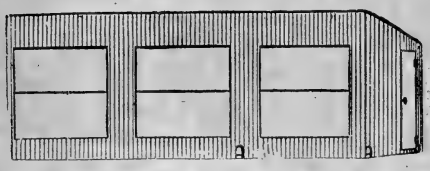
MOVABLE POULTRY HOUSE.

The house is surrounded with a drain which carries off all the moisture and water, and prevents dampness. Inside the house is cemented all through, and these cemented floors are covered with gravel two inches deep. The house is heated in the cold weather just enough to keep water from freezing. The plan of this hennery is remarkable for its simplicity and hygienic arrangement. The cost of the labor and material is under $500.

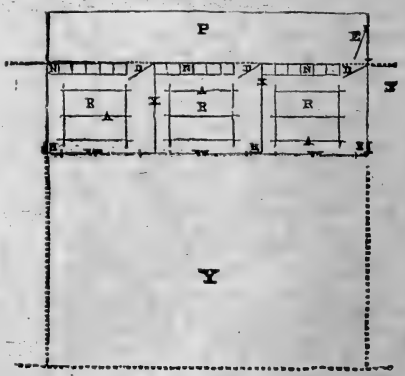
Movable Poultry House.—Those who have tried movable poultry houses regard them as exceedingly profitable arrangements, and very desirable. We give an illustration of one in use in England, which is mounted on wheels, with a floor raised high enough above ground to form a dry run. It has a set of movable laying nests at back, outside flap-door with lock, large door with lock, for attendant, small sliding door and ladder for fowls, two shifting perches,

and sliding window. The benefit birds of all description derive from change of place, not only arises from the pleasure every animal as well as man derives from changes of scene, but by being preserved from the exhalations emitted by excrementitious matter and decaying food.

Model Poultry House.—We give a plan of poultry house and yards, combining many good points and conveniences. The building is enclosed with worked spruce or pine boards, put on vertically, and the height so arranged that each board will cut to avoid waste. All the pieces are cut off of the full lengths in front, making just half a rear length. The rafters of thirteen feet joist, with either battened or shingle roof as preferred. The building is supposed to face the south. The entrance door, E, opening into the passage, P, three and a half feet wide, which runs the length of the building; smaller doors, D, each two feet wide, opening into the roosting room, R. The nests are raised about a foot from the floor, and also open into the room R, with a hinged board in the passage, so that the eggs can be removed without entering the roosting rooms. The perches, A, are movable, perfectly level, and raised two feet from the floor. The partition walls are tight, two boards high, above which is lath; the passage wall above the nest, and also the doors, D, being of lath also.



ELEVATION.—LENGTH, 24 FEET; WIDTH, 11 FEET; HEIGHT, IN FRONT, 9 1-2 FEET; HEIGHT, IN REAR, 6 1-2 FEET.



PLAN AND YARD.

The roosting-rooms are seven and a half by eight feet, large enough for twenty-five fowls each. Windows are six feet square, raised one foot from the floor. We prefer the glass to be six by eight or seven by nine inches—as these small sizes need no protection strips to prevent the fowls from breaking them. The holes, H, for egress and ingress of the fowls, are closed by a *drop* door worked by a cord and pulley from the passage way. Another door can be placed in the other end of the passage way if desirable. This arrangement of the yards, Y, of course would not suit every one; some would prefer smaller yards, making each yard the width of the room and adding to its height. The house above is designed for only three varieties; but by simply adding to the length, any number of breeds may be accommodated. The simplest and most economical foundation is to set locust or oak posts about four feet deep, every eight feet, and

spike the sills on them. There is then no heaving from frost; and all the underpinning necessary is a board nailed to the sill and extending into the ground a couple of inches. A setting room can be added by making the building four feet longer. The room should be in the end next the door, so as to be always within notice.

Such a house built of seasoned lumber and well battened, will shelter any fowls — excepting, perhaps, the Spanish, Leghorns, and a few of the more tender varieties—from all ordinarily cold weather; and we believe it to be the cheapest and most convenient house for general use.

CHICKEN AND DUCK INCLOSURE.

Chicken and Duck Inclosure.—We present herewith a plan for chicken or duck coops, with inclosures, which will be found very convenient fixtures in any poultry-yard. These coops are made so that they are movable, and can be constructed by almost any one conversant with the use of a hammer and nails. Any refuse boards and odd pieces are all that are necessary to build them. The coops can be set in any desired position, then fenced in with boards twelve to sixteen inches wide, as shown in our engraving, with stakes driven in the ground on each side of the boards at intervals, to keep them from falling over. Put up in this manner the stakes can be withdrawn at will and the inclosure moved as often as desirable. For partitions our engraving has shown a light wire mesh, which is easy to handle and can be procured at a very small cost. This is fastened into position by pinning down with wooden pins, which, in this way, is made also movable.

Caponizing.—Caponizing is not a very difficult operation, and any one who is blessed with the average amount of brains and common sense can soon learn to caponize as quickly and as successfully as an "expert." We know that some one will probably tell you that the instruments used are "very delicate," and the operation can only be safely performed by an ex-

pert; but don't believe it. We once wrote out the directions for caponizing, and sent them to a lady who was anxious to know how to perform the operation. With the written directions before her, she first operated on some half-dozen of cockerels that had been killed for table use, and then tried her hand on the living birds, with excellent success. In three days, besides doing her usual housework, she caponized 162 cockerels, and only three of them died from the effects of the operation.

If you live near any one who understands caponizing, and is willing to teach others, go and learn how, but if you cannot do that, go and get a set of instruments and teach yourself. A set of caponizing instruments consists of a pointed hook, a steel splint with a broad, flat hook at each end, a pair of tweezers, and a pair of crooked concave forceps. In the first place, kill a young cockerel and examine it carefully, so that you will be able to tell the exact position of the organs to be removed. You will find them within the cavity of the abdomen, attached to the back, one on each side of the spine. They are light colored, and the size varies with the age and breed.

After you have "located" the parts to be removed, practice the operation on chickens that have been killed, until you are sure that you can operate quickly and safely; then you may try your hand on the living birds. Place the bird on its left side in a rack that will hold it firmly in position without injuring it, or else draw the wings back and fasten them with a broad strip of cloth; draw the legs back and tie them with another strip; then let the attendant hold the fowl firmly on the table, one hand on the wings and head, the other on the legs, while you perform the operation. Remove the feathers from a spot a little larger than a silver dollar, at the point near the hip, upon the line between the thigh and shoulder. Draw the skin backward, hold it firm while you make a clean cut an inch and a half long between the last two ribs, and lastly through the thin membrane that lines the abdominal cavity. In making the last cut, take care and not injure the intestines. Now take the splint and separate the ribs by attaching one of the hooks to each rib, and then allowing the splint to spread; push the intestines away with a teaspoon handle, find the testicles; take hold of the membrane that covers them and hold it with the tweezers; tear it open with the hook; grasp the spermatic cord with the tweezers, and then twist off the testicle with the forceps. Remove the other in the same way. The left testicle is usually a little farther back than that on the right, and should be removed first. During the operation take care not to injure the intestines, or rupture the large blood vessels attached to the organs removed. The operation completed, take out the splint, allow the skin to resume its place, stick on some of the feathers that were removed, which will absorb the blood and cover the wound; give plenty of drink, but feed sparingly on soft cooked food for a few days, or until they begin to move around pretty lively.

To prepare cockerels for caponizing, shut them up without food or drink for twenty-four hours previous to the operation, for if the intestines are full the operation will be more difficult and dangerous. Cockerels that are intended for capons should be operated upon between three and four months of age. Cockerels of any breed may be caponized, but of course the larger breeds are the best. A cross between the Light Brahmas and Partridge Cochins will produce extra large cockerels for capons, but only the first cross is desirable. Capons grow fully one-third larger than the ordinary male fowl of the same age and breed. Their flesh is more delicate and juicy, and they command prices, from thirty to fifty per cent. higher than common poultry, but outside the largest cities there is no market for them.

Good and Cheap Incubators.—For the benefit of those who desire to experience some of the pleasures and profits of artificial incubation, we here give a model of a very simple and reliable incubator, with directions for making the same.

Have a pine case made somewhat like a common washstand (see Fig. 2) without the inside divisions.

About a foot from the floor of this case, place brackets like those in Fig. 1, and on a level with these screw a strong cleat across the back of the case inside. These are to support the tank.

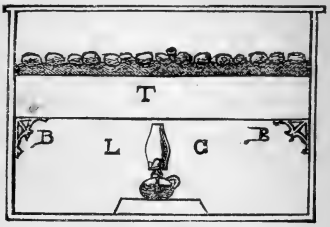


FIG. 1.—INSIDE OF INCUBATOR. FRONT SECTION—T, TANK; L C, LAMP CLOSET, B B, BRACKETS.

The tank should be made of galvanized iron, three inches deep and otherwise proportioned to fit exactly within the case and rest upon the brackets and cleat. The tank should have a top or cover soldered on when it is made. At the top of this tank in the center should be a hole an inch in diameter with a rim two inches high, and at the bottom, toward one end, a faucet for drawing off the water. When the tank is set in the case fill up all the chinks and cracks between the edges of the tank and the case with plaster Paris to keep all fumes of the lamp from the eggs.

Fill the tank at least two inches deep with boiling water.

To find when the right depth is required, gauge the water with a small stick. Over the top of the tank spread fine gravel a quarter of an inch thick; over this lay a coarse cotton cloth. Place the eggs on the cloth, and set a kerosene safety-lamp under the center of the tank.

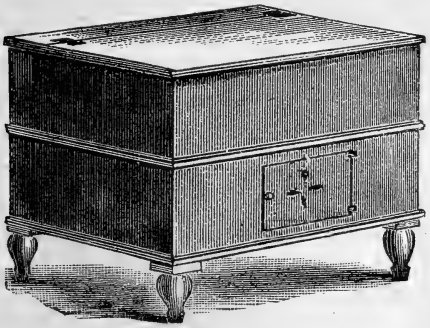


FIG. 2.—INCUBATOR CLOSED.

The door of the lamp-closet must have four holes for ventilation, otherwise the lamp will not burn. The lamp-closet is the space within the incubator under the tank. Turn the eggs carefully every morning and evening, and after turning sprinkle them with quite warm water. Two thermometers should be kept in the incubator, one half way between the center and each end; the average heat should be 105 degrees.

If the eggs do not warm up well, lay a piece of coarse carpet over them. If they are too warm, take out the lamp and open the cover for a few minutes, but do not let the eggs get chilled. If they should happen to get down to 98 degrees, and up to a 108 degrees, you need not think the eggs are spoiled. They will stand such a variation once in a while; but of course a uniform temperature of 105 degrees will secure more chickens, and they will

be stronger and more lively. In just such an incubator as the one described, the writer hatched over two hundred chickens two years ago.

For those who are ambitious to try top heat, the same sort of a tank is required, but a boiler must be attached at the side with an upper and lower pipe for circulation. Any plumber can attach the boiler, and the faucet must be at the bottom of the boiler on one side.

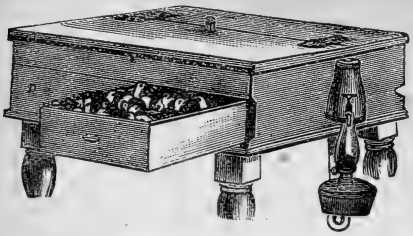


FIG. 3.—TOP HEAT INCUBATOR, ON TABLE.

The drawers containing the eggs should slide beneath the tank. A stand for the lamp should be screwed to one end of the case in such a position as to bring the lamp under the boiler (see illustration above). This incubator can be cooled by raising the lid, turning down the lamp and pulling the drawers part way out.

In both incubators while the eggs are hatching sprinkle them two or three times with quite warm water. After the chicks are hatched they need a warm cover, a good run, plenty of clean gravel, fresh water, fine cracked corn, and green food every day.

FIG. 4.—FORM OF TANK.

How to Raise Artificially-Hatched Chickens.—The following article is from the pen of a gentleman who has given the matter of the artificial hatching of chickens much careful study, and he tells how to successfully raise the young chicks after being so hatched:

"It is evident to the most casual observer that chickens hatched without a mother must be raised without a mother. Born orphans, they must remain orphans. When my incubator produced the first chick, what a commotion there was in the house. The birth of a baby wouldn't have been a circumstance to it; and while the women-folks would have known what to do with a new baby, we all looked at one another with blank bewilderment when the question was asked what we should do with the new chick. The thermometer outside was down nearly to the freezing point, while in the incubator the temperature was 105 degrees. The little chick's hair stood on end, and he was panting for dear life. He must come out of there, and as his brothers and sisters were following him out of the shells, we began to prepare all sorts of receptacles for them. We rigged up a mother on the heater, and put in it several chicks that lived a few hours and then died. We decided it was too cold, so we put others in a box and put them back in the

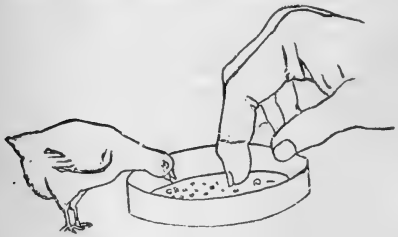


FIG. 1.

incubator, where some of them were smothered with the heat. It was evident something must be done, or we would soon have no chicks to experiment with. I determined in my own mind that a temperature of about ninety degrees would be correct, so I rigged up the brooder and started the lamp, put in the thermometer, and when the proper degree of heat was reached, put what was left of the chicks into the brooder, and they began to brighten up. The problem was solved, though its solution cost me the lives of many fine chicks.

"With further experience, I find the following treatment a complete success: After the chick breaks the shell, let him scramble around and dry himself in the incubator, which will generally take a few hours, though some are much stronger than others. After too much exercise they begin to pant, and should, of course, be removed. I have a box twelve inches square and six inches high. To the lid of this tack strips of woolen cloth an inch wide and two inches apart. These rags should hang within two inches of the bottom. Put a half inch of dry sand in the box. The brooder is kept at a temperature between eighty and ninety degrees. The young chicks, when perfectly dry, are taken from the oven and put in the box, and the box put in the brooder where the other chicks are. Air holes should be cut in the *lid* of the box, for if cut in the side the other chicks peck out the feathers of the little ones through these holes. This box keeps the chicks warm, and they soon brighten up, and at the end of twelve hours are ready to take the first lesson in eating. Take a hard boiled egg and chop the white and yelk up together as fine as grains of wheat; with it cover the bottom of a little pan —the top of a blacking box will do. Place this in the box with the chicks, and, while tapping with the finger in the feed, repeat 'tuck, tuck,' like the clucking of a hen (Fig. 1). A little patience, and one chick will see something and peck at it, when the others will follow suit, and in a few minutes the first lesson is learned. After a few meals, with this process repeated, it will be only necessary to rap on the box, and the little fellows will be ready for their meal, and also be spry enough to be put out of the box and run with the others in the brooder.

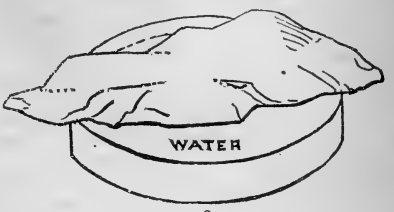


FIG. 2.

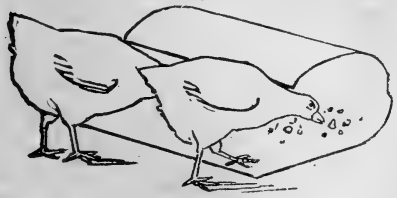


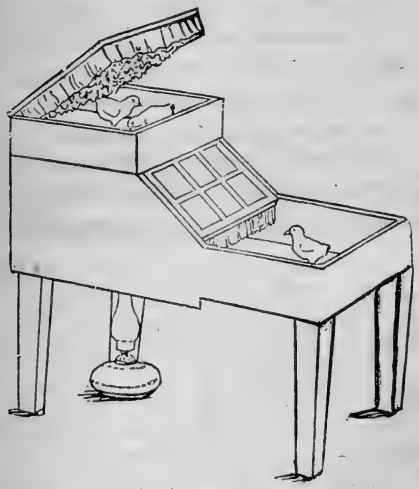
FIG. 3.

"The next lot of chicks I feed as follows: Stale wheat bread is soaked in water. A cupful of oatmeal or rice has boiling water poured over it, and is stirred until it takes up all the water. I mix two handfuls of soaked bread, with the water squeezed out, with one handful of this oatmeal, and dry it all with unbolted cornmeal until it crumbles freely. A little salt is mixed up with it. This, with a little meat once a day, is their sole feed, and it is given about every three hours until the chicks are a week old, or until the wings

are large enough to cover their backs, when they are put in a pen. This lot is fed the above mixture five or six times, with meat or worms once a day, and a head of cabbage is hung in the pen for them to peck at. The bottom of this pen is covered with dry sand and ashes, with a pile of old mortar and broken oyster shells to be picked over.

"For a water fountain I use a small tin pan, covering with a stone all the top except just enough to allow the chicks to drink, as shown at Fig. 2. Turn the open part next to the wall, so the little things cannot scratch dirt into it. Chicks are very fond of scratching the feed out of the pan. To prevent this I take a sheet of tin (Fig. 3), bend it over, and put the feed under the bent part. This prevents their treading on or scratching out the feed, and caters to their natural taste for hunting under things for food. It is also cleaned more readily than a pan.

"The body of the brooder (Fig. 4) is made of zinc, with an air-chamber over and under the back end. The lamp setting under it sends the heat up through the heater and out through the top, where a nursery for young or sick chicks is placed to utilize the waste heat. This form of brooder, with a warm chamber and the chicks feeding in the open air, I believe to be better than those where the chicks are never subjected to a cool atmosphere. The short stay while they feed in the open air tends to harden and invigorate them. All brooders, boxes, or pens, used to keep large numbers of chicks in, should have the bottom lined with zinc, as wood or earth is sure in time to become saturated with excrement, no matter how clean you try to keep it, and it is the ammonia arising from these tainted floors that causes such pens in time to prove fatal to the chicks. I promised to tell the truth about my experience in hatching the eggs, and here it is: The last eggs that hatched out were bought October 10th. Up to that time I had purchased one hundred and five eggs at thirty cents a dozen. About one-third of these proved unfertile, and were cooked and eaten, or hard-boiled and fed to the young chicks, leaving about seventy-five eggs for the incubator to work on. Out of these I now have twenty-seven as fine chicks as I ever saw. By my own awkwardness and want of experience, I have killed or lost fully one dozen. My machine was an old one, and the battery was worn out. The gauge never was worth a cent. All the defective parts have been renewed except the gauge, and I have learned to doctor that. Owing to the above faults, the temperature in the oven has run too low for days at a time, and for hours it has been at 82 degrees, while it has



BROODER.—FIG. 4.

taken short trips as high as 110 degrees. The only wonder is that I got a chicken out of any of the eggs. It is astonishing how much an egg will stand.

"From my experience with hens I am satisfied I will be able to get more chicks from a given number of eggs with the incubator than I ever could with hens. It would be a poor hand who could not raise from a fourth to a third more chicks with brooders than with the best hens."

Packing Eggs for Market.—We present herewith three different styles or methods of packing eggs for shipment or for storage, any one of which will be found simple, inexpensive and practical.

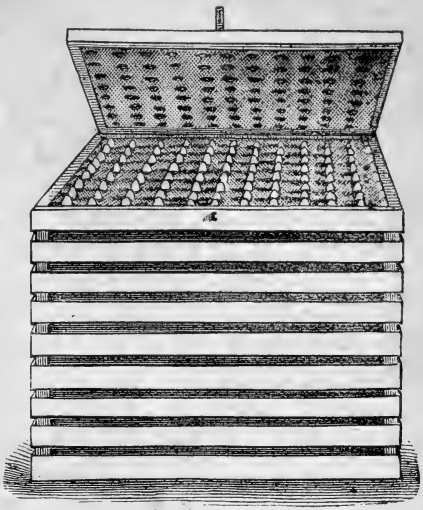


FIG. 1.—CANVAS COVERED CASE.

Our illustration, Fig. 1, represents a substantial carrying case, with nine drawers, the frames of which are of wood covered with canvas or sacking, with cords or strings underneath, for the purpose of keeping the eggs in their places. The sacks, at the top and bottom, have depressions, as shown in the cover of the engraving, so that the eggs fit snugly and are not liable to be displaced by handling or transporting. Each alternating layer, coming between these depressions in each box or drawer, fills up the interstices perfectly. With proper care these cases will last for years, are always ready for packing and can be filled as the eggs are laid, thus avoiding repeated handling. The eggs can also be kept in them perfectly secure when the owner desires to hold his stock for better market. There are nine layers or drawers of eggs in this box, each layer containing eight dozen, or a total of seventy-two dozen of eggs.

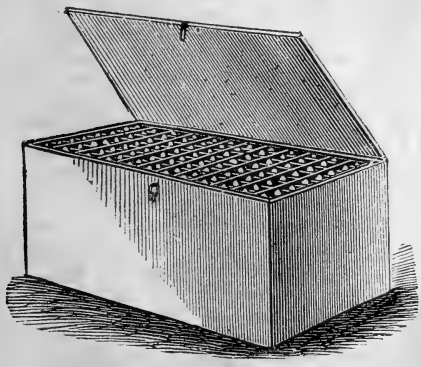


FIG. 2.—COMMON TRANSPORTING CASE.

Fig. 2. shows a cheaper case in every respect. It is a common packing box, made with paste or binders' board partitions, and each layer of eggs is

covered with the same material. One point connected with packing in these boxes the shipper should know and guard against; that is, it is sometimes the case that the pasteboard cover, on which the eggs are placed, is composed of two pieces, and during transporting or handling these pieces become displaced, or pass each other; then the eggs above drop down on the lower ones and break them. This difficulty, however, can easily be avoided by passing a piece of stiff paper over the joints, which will prevent them passing each other. Any sized box desired can be used for this style of case, and, with a little care on the part of the packer of the eggs, can be carried as safely as with any of the patent boxes now in vague.

Fig. 3 consists of an outside case or crate, in which are fitted a number of trays with cord laced through the sides and ends, dividing the spaces into small squares or meshes, and making a delicate spring, which responds to the slightest jar. Rows of pockets are suspended from the cord work, giving to each a separate apartment, and so arranged that no jar nor jolt the carrier may receive can cause one egg to strike another, and being thus separated, a free circulation of air is obtained, which prevents heating by any possibility. Each tray is provided with a protector, which keeps the eggs in the pocket even though the carrier be overturned. As each tray contains a certain number, no errors in count can ever occur, and the purchaser can determine at a glance both the number and quality of the eggs. By using this carrier a child can pack as well as a man. One of these carriers, the size shown, will hold sixty dozen of eggs.

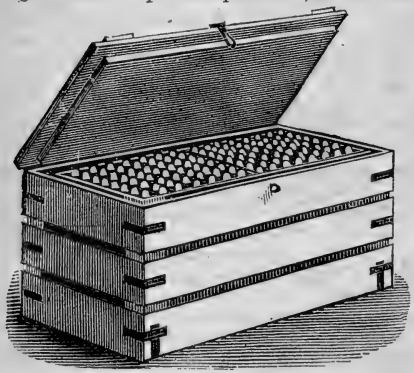


FIG. 3.—SUSPENSION EGG CARRIER.

Milk for Hens.—Fanny Field thus expresses herself as to the food value of milk for hens: "I quite agree with the correspondent of the *American Poultry Yard*, who declares there is no feed on earth so good for fowls and chicks as milk in some form. For very young chicks we make the clabbered milk into Dutch cheese, and use the whey to mix feed for other fowls and chickens. From the time they are a week old till sent to market for broilers, our early chicks have all the milk, sweet or sour, or buttermilk, that they can drink. If the home supply of milk falls short of the demand, we buy skim milk at two cents a quart, and consider it cheap at that. For laying hens in winter there is nothing better than a liberal supply of milk. A pan of warm milk, with a dash of pepper in it, every morning, will do more toward inducing hens to lay in cold weather than all the egg-food in creation. For fattening fowls, we find that boiled vegetables mixed with milk and barley or cornmeal will put on flesh at an astonishing rate. Don't be afraid to give milk to fowls or chicks; from the time when the chicks are given the first feed up to within the last day of the old fowl's life, milk may be safely and profitably given."

Poultry Keeping for Profit.—During the year 1884, Mr. Henry Stewart contributed to the *New York Times* a series of articles containing many valuable suggestions for those who wish to make poultry-keeping a business. His plan is briefly as follows: Each yard is to consist of a plot of ground about 100x400 feet, containing nearly one acre, with a suitable fence. The house is placed in the center of the yard and a cross-fence on a line with the house divides it into two parts. These two parts are alternately sown thickly with some crop that will afford forage for the fowls. In September they are placed on one side sown thickly with turnips. The other is immediately plowed up and sown with rye. The fowls will do very well for the winter in one side, with an occasional day in the green rye. In November wheat is sown, after the turnips are eaten off. In April we may sow oats, in May corn, in June rape or mustard seed and in July begin the rotation again with rutabagas.

As a rule a house twenty-five feet long, ten feet wide, eight feet high in the front and five feet in the rear, will be quite large enough for the one hundred fowls to be kept in each yard. This should be cleaned at least once a week, the oftener the better. The inside walls are quite smooth, having no fixtures except the roosting poles, which are on a level one foot from the ground. This leaves no harbor for vermin. The nests are loose boxes. Mr. Stewart also suggests that where a series of yards are kept, the inside fences may be movable, so that while the fowls are all confined to one side, the fences may be removed from the other, thus facilitating the plowing and planting.

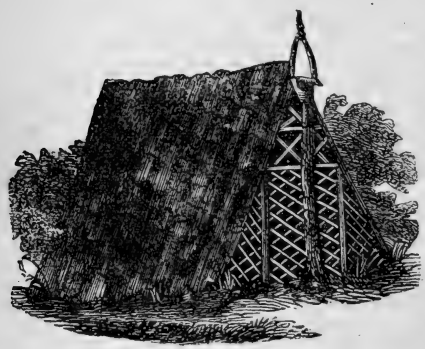
"It is evident," he adds, "that this system will greatly enrich the soil, and this may be turned to good account by raising fruit trees in the poultry yards. No other fruit crop pays so well as plums, but none is so hard to grow on account of the pestiferous curculio. But when plums are grown in a poultry yard this insect has no chance. The sharp eyes of the fowls let no rogue escape, and one can raise plums with success and profit. As 200 of these trees can be planted on one acre, there is a possibility of $400 per acre from the fruit as well as $200 from the fowls; for every hen well cared for should make a clear profit of two dollars in the year. The yards may be planted with dwarf pear trees, with equal profit or more, because 300 of them may be placed on one acre. The shade of these trees is invaluable." It is also recommended that a row or small grove of Norway Spruce, Arbor-vitæ or Austrian pine be planted each side of the house to serve as a wind break for the fowls in winter.

Raising Chickens by Artificial Mothers.—Mr. E. S. Renwick writes from a large experience upon the above subject, in the *American Agriculturist.* He says:

When a fancier raises forty or fifty chickens a year, as amusement, the amount of care which he gives them is never taken into account; but if the number of chickens be increased to several hundreds, some means must be provided by which so large a number can be taken care of without too much labor. For supplying warmth and protection to young chickens, various "artificial mothers," or "brooders," have been devised. Those in the market are well enough adapted to the raising of a small number of chickens of nearly the same age, but it becomes a difficult matter when from two hundred and fifty to five hundred are to be raised, and of all ages, from those just hatched to those large enough for broilers. Young chickens must have plenty of air, exercise and wholesome green food; and means of protection

against injury must be provided. Where young chickens of different ages are together, the elder tyrannize over the younger, the newly-hatched chickens being frequently trampled to death, or are driven away from their food by the stronger. Young chickens are very often lost in the grass when at liberty, and are frequently wet and chilled. Hence, to successfully raise a large number of chickens by hand, various means must be provided by which those of different ages can be separated, and by which the chickens can be protected and at the same time have sufficient liberty for exercise and development in the open air.

A Rustic Poultry House.—The rustic poultry house here illustrated is not only convenient, but designed to beautify the poultry yard of any amateur or breeder. For the rustic work, join four pieces of sapling in an oblong shape for sills; confine them to the ground; erect at the middle of each of the two ends a forked post, of suitable height, in order to make the sides quite steep; join these with a ridge pole; put on any rough or old boards from the apex down to the ground; then cover it with bark, cut in rough pieces, from half to a foot square, laid on and confined in the same manner as ordinary shingles; fix the back end in the same way; and the front can be latticed with little poles, with the bark on, arranged diamond fashion, as shown in the engraving. The door can be made in any style of rustic form. The roosts, laying and setting boxes can be placed inside of the house, in almost any position, either lengthwise or in the rear. From the directions here given one can easily build a house of any desired size, and in any location in the poultry yard he wishes; but to make the rusticity of the house show off to the best advantage it should be placed amid shrubbery.



A RUSTIC POULTRY HOUSE.

The Hatching Period.—Setting hens should have a daily run. Do not remove them forcibly from their nests, but let the door be open every day at a given hour for a certain time while the attendant is about. Perhaps for the first day or two you may have to take them gently off their nests, and deposit them on the ground outside the door. They will soon, however, learn the habit and come out when the door is open, eat, drink, have a dust-bath and return to their nests.

While hens are off their nests some people dampen the eggs with lukewarm water. It is claimed that moisture is necessary, and that the chicks gain strength by the process. This may be correct, and in very dry weather, perhaps, necessary. It is generally, however, a mistake to meddle too much with nest or eggs; the hen is only made restless and dissatisfied by so doing. While the eggs are hatching out it is best not to touch the nests. It is very

foolish to fuss the old bird and make her angry, as she may tread on the eggs in her fury, and crush the chicks when they are in the most delicate stage of hatching.

Picking off the shell to help the imprisoned chick is always a more or less hazardous proceeding, and should never be had recourse to unless the egg has been what is termed "billed" for a long time, in which case the chick is probably a weakly one and may need a little help, which must be given with the greatest caution, in order that the tender membranes of the skin shall not be lacerated. A little help should be given at a time, every two or three hours; but if any blood is perceived stop at once, as it is a proof that the chick is not quite ready to be liberated. If, on the contrary, the minute blood vessels which are spread all over the interior of the shell are bloodless, then you may be sure the chick is in some way stuck to the shell by its feathers, or is too weakly to get out of its prison-house.

The old egg shells should be removed from under the hen, but do not take away her chicks from her one by one as they hatch out, as is very often advised, for it only makes her very uneasy, and the natural warmth of her body is far better for them at that early stage than artificial heat. Should only a few chicks have been hatched out of the sitting, and the other remaining eggs show no signs of life when examined, no sounds of the little birds inside, then the water test should be tried. Get a basin of warm water, not really hot, and put those eggs about which you do not feel certain into it. If they contain chicks they will float on the top, if they move or dance the chicks are alive, but if they float without movement the inmates will most likely be dead. If they (the eggs) are rotten they will sink to the bottom. Put the floating ones back under the hen, and if, on carefully breaking the others, you find the test is correct (one puncture will be sufficient to tell you this), bury them at once.

Chickens should never be set free from their shells in a hurry, because it is necessary for their well-being that they should have taken in all the yelk, for that serves them as food for twenty-four hours after they see the light, so no apprehension need be felt if they do not eat during that period, if they seem quite strong, gain their feet, and their little downy plumage spreads out and dries properly. Their best place is under the hen for the time named.

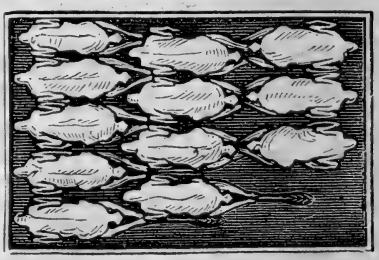
When all are hatched, cleanse the nest completely, and well dredge the hen's body with sulphur powder; give her the chicks, and place chopped egg and bread-crumbs within reach. The less they are disturbed during the first two or three days the better. Warmth is essential, and a constantly brooding hen is a better mother than one which fusses the infant chicks about and keeps calling them to feed. Pen the hen in a coop and let the chicks have free egress. The best place to stand the coops is under sheltered runs, guarded from cold winds, the ground dry, and deep in sand and mortar siftings. Further warmth is unnecessary if the mothers are good; and if the roof is of glass, so as to secure every ray of sun, so much the better. Cleanliness of coops, beds, flooring, water vessels and flood tins must be absolute. The oftener the chicks are fed the better, but food must never be left; water must be made safe, or death from drowning and chills may be expected. The moment weather permits, free range on grass for several hours daily is desirable, but shelter should always be at hand.

Packing Poultry for Market.—All poultry should be thoroughly cooled and dried before packing, preparatory for shipment to market. For

packing the fowl provide boxes, as they are greatly preferable to barrels. Commence your packing by placing a layer of rye straw, that has been thoroughly cleaned from dust, on the bottom of the box. Bend the head of the first fowl under it, as shown in our illustration (Fig. 1), and then lay it in the left hand corner, with the head against the end of the box, with the back up. Continue to fill this row in the same manner until completed; then begin the second row the same way, letting the head of the bird pass up between the rump of the two adjoining ones, which will make it complete and solid (see illustration, Fig. 2). In packing the last row, reverse the order, placing the head against the end of the box, letting the feet pass under each other. Lastly, fill tight with straw, so that the poultry cannot move. This gives a firmness in packing that will prevent moving during transportation. Care should be taken to have the box filled full.

PACKING POULTRY.—FIG. 1.

Poultry Raising as a Business.—Mr. P. H. Jacobs, a practical poultry man, writes as follows in the *American Agriculturist:* A flock of ten hens can be comfortably kept in a yard twenty feet wide by fifty deep. An acre of ground will contain forty such yards, or four hundred hens. No cocks are necessary unless the eggs are desired for incubation. To estimate $1.50 as a clear profit for each hen, is not the maximum limit, but the profit accrues according to the management given. Poultry thrives best when running at large, but this applies only to small flocks. Hens kept by the hundred become too crowded while at large, no matter how wide the range, and sickness and loss occur. Large flocks must be divided, and the size of the yard required for a flock is of but little importance compared with that of the management. There is much profit to be derived from the sale of young chicks—and, where one pays attention to the business—they receive the greatest care. Each brood, like the adult, is kept separate from the others in a little coop, which prevents quarreling among the hens, and enables the manager to count and know all about the chicks. This is very important, as there are many farmers who hatch scores of broods and yet cannot tell what became of two-thirds of them. Hawks, crows, cats, rats, and other depredators take their choice, and the owners are no wiser. Each setting hen should be in a coop by herself, and each coop should have a lath run. The critical period is the forming of the feathers, which calls for frequent feeding, and when they have passed that stage, the chicks become hardy. The houses need not be more than eight feet square for each family, and can be doubled. If possible, it is best to have changeable yards, but, if used, a less number



PACKING POULTRY.—FIG. 2.

can be kept to an acre. If the yards are kept clean by an occasional spading, however, green stuff may be grown elsewhere and thrown over to them. This may consist of cabbage, grass, turnip tops, kale, mustard, lettuce, etc. Watering must not be neglected, or the meals given irregularly. Care must be observed not to feed too much, as over-fat fowls will lay few eggs, and such eggs will not hatch. A good poultry manager is always among his fowls, and observes everything. The breeds have special characteristics also. The large fowls must be hatched in March, if early pullets are desired for winter laying. This applies to Brahmas, Cochins and Plymouth Rocks. If the manager finds this impossible, he should at once substitute cocks of the Leghorn breed, which crossed with large hens, make good marketable chicks, and produce pullets that mature early. A knowledge of the characteristics of the several breeds is indispensable to success. Crossing pure-bred cocks with common hens is excellent, but "fancy poultry" is not profitable to any but those who understand thoroughly the mating and selection of the several breeds.

Poultry on a Large Scale.—People thinking of raising chickens on a large scale will do well to note the following sound advice by the *Poultry Monthly:*

"There are many persons of moderate means who have had perhaps some little experience with breeding poultry, and who get to wondering if it will pay to breed poultry on a large scale; whether it will pay to embark in the breeding of poultry for market purposes as a business, and if it is good policy to give up a fair paying clerkship or small business to engage in it. Such questions are very difficult to determine to the satisfaction of all persons concerned, for much more really depends on the person than on the business in nearly every department of human industry, and where one person may make a success of any undertaking another one may fail, though having started with equally as good chances of success. Poultry, to be successful on a large scale, must be kept in small colonies of about fifty birds each, for many more than that number in a single house is apt to cause sickness or disease, ere long, among them. Small flocks like that can be given better attention than larger ones, and the first approach of disorder can be seen readily and promptly checked, while there is less danger of great loss when thus kept in small flocks, as the trouble can usually be confined to the flock in which it started by proper and prompt sanitary measures. When the breeder is not too far away from large retail markets, and especially where the breeder can market them himself, thus saving commission, freight, and loss, it pays best to breed and keep poultry for the eggs they produce, as eggs known to be strictly fresh are always in good demand at quite an increase in price over that received for the ordinary "store" eggs. Such breeds as the white and the brown Leghorns, and birds bred from them, either pure breed or cross breed or grade, as a basis, are first-class egg producers, while a game cock is also valuable to breed to good common hens, producing, as a rule, vigorous, active pullets, which are invariably good layers. Those who wish to raise poultry principally for the flesh should raise the light Brahmas, Plymouth Rocks, dark Brahmas, or some of the Cochin breeds, the first two named, however, being general favorites in this respect, and also combining with it good laying qualities under favorable circumstances. Those who cannot or will not give the poultry regular or constant attention, shelter them properly, supply proper food in liberal quantities and at frequent and regular intervals, and pay a strict attention

to cleanliness and thoroughness in all the details of the management, need not expect even to succeed, not to even consider the question of loss or profits, for success and profit here means work, work, work."

Feeding Hoppers for Fowls.—We give herewith designs for two styles of feeding hoppers for fowls, deeming anything that has a tendency toward economy will be beneficial to the farmer as well as to the amateur breeder of fowls.

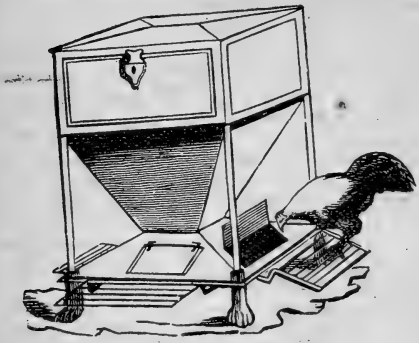


FIG. 1.—FEEDING HOPPER.

The illustration, Fig. 1, represents a very good and easily constructed hopper, that can be made to contain any quantity of corn required, and none wasted. When once filled it requires no more trouble, as the grain falls into the receiver below as the fowls pick it away, and the covers on that which are opened by the perches, and the cover on the top, protect the grain from rain, so that the fowls always get it quite dry; and as nothing less than the weight of a fowl on the perch can lift the cover on the lower receiver, rats and mice are excluded.

Our illustration, Fig. 2, represents "a perfect feeding hopper," which, from the description here given, can be easily constructed by any person. A is an end view, eight inches wide, two feet six inches high, and three feet long; B, the roof projecting over the perch on which the fowls stand while feeding; C, the lid of the receiving manger raised, exhibiting the grain; E, E, cords attached to the perch and lid of the manger or feeding trough; I, end bar of the perch, with a weight attached to the end to balance the lid, otherwise it would not close when the fowls leave the perch; H, pully; G, fulcrum. The hinges on the top show that it is to be raised when the hopper is to be replenished.

FIG. 2.—A PERFECT FEEDING HOPPER.

When a fowl desires food it hops upon the bars of the perch, the weight of which raises the lid of the feed box, exposing the grain to view, and after satisfying its hunger jumps off, and the lid closes. Of course the dimensions of either of these feeding hoppers may be increased to any size desired.

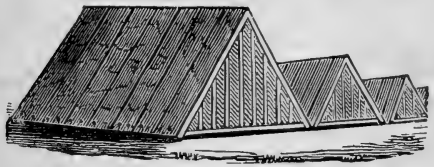
Winter Egg-Production.—The following is from the *Country Gentleman:* To obtain a breed of fowls that are perpetual layers is the object that many aim at. This is an impossibility, for nature will exhaust itself and must have a period of rest. In order that we have a perpetual production of fresh eggs, the business must be arranged beforehand. There is a difference in breeds, some laying better than others at any time of the year, and others, again, giving their eggs in winter. There is little difficulty in obtaining eggs in summer, but the winter eggs must be worked for, and the fowls managed beforehand. Hens that have laid well during the summer cannot be depended on for late fall or early winter, even if well fed, but will generally commence in January, and keep it up throughout February and March, giving a good supply of eggs if not too old. But it is better not to allow such birds to go into the winter. They are generally fat, after having finished the annual moult, and should be killed for the table. After the second annual moult hens are apt to become egg-bound, especially if well fed and fat. The excess of fat that accumulates about the lower intestines and ovaries weakens these organs and renders them incapable of performing their offices. Hence the fowl suffers and becomes profitless. When left too long the bird becomes feverish and the flesh is unfit for food. The better way is to avoid this trouble, since there is no cure, by not allowing the birds to go into the second winter. Trouble of this kind seldom occurs with pullets or young hens.

To obtain a supply of winter eggs, we must have the chicks out in March or April. Leghorns and some of the smaller breeds will do in May or the first of June, but the Brahmas and Cochins must come off early, that they may have the full season for growth. The Asiastics are generally good layers in winter, and need less artificial heat, as nature has not furnished them with any ornamental appendages which suffer by exposure to frost. For them it is not necessary to spend large sums in warm buildings. What they can dispense with in this respect they demand in feed, which must be given regularly. The feed must be kept up and varied with animal and vegetable diet. The supply of water must never fail. We must feed and feed a long time before the eggs will come. Any breed of hens will consume an enormous quantity of feed before commencing to lay, but after having once begun they will not require, or even take so much grain. When laying, their great craving is for vegetable and animal substances, and crushed clam or oyster shells.

Fowls that are regularly trained have certain portions of the day for their different feeds. My birds require their shells at night, as well as their greens, and their grain in the morning, and always fresh water. When one has the time and convenience, and enjoys the petting of fowls, making warm stews on very cold days is an admirable plan, and the birds relish them marvelously. Take beef or pork scraps, and put into an old kettle, having them previously chopped fine, and fill it half full of water. While stewing, throw in a dozen chopped onions, two dozen cayenne peppers, and the day's coffee and tea-grounds. Thicken the mixture with cornmeal, and serve it around among the hens hot. They relish it amazingly when once taught to eat it, and will look for the ration daily at the certain time. On cold winter days give this feed between two and three o'clock in the afternoon, and the chicks get their crops warmed up for the coming cold at night. If scraps are not handy, boil unpeeled potatoes, and serve in the same manner, adding a little grease or cold gravies left over from yesterday's dinner.

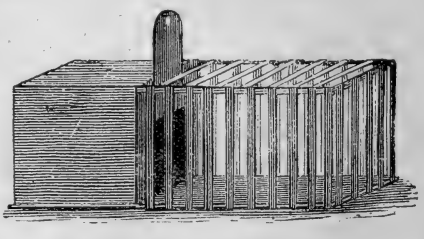
The combed varieties require warmer quarters and sunnier exposure

than the Asiatics, and are good winter layers after December and early January. They will lay in the fall if early hatched, but the change of fall to winter, and the getting into winter quarters affects them, and they seldom commence again before the days begin to lengthen, at which time Brahmas will cease egg-production and become broody. Where one has the convenience it is well to keep both kinds, in order to insure a supply of eggs. It is useless to expect many eggs from old fowls of any variety. Have the buildings ready early, and the fowls of the right age and in condition to insure success. The business of our domestic hen is to produce eggs, and we must feed her for it.



CHICKEN COOP.—FIG. 1.

A Chicken Coop.—Nail short pieces of matched boards together as indicated in the cut; then board up the rear end tightly, and nail narrow strips of boards or lath in front; put a floor of boards in the back part of the coop, large enough for the hen to brood her young upon, and lay a wide board in front to feed upon, as long as the width of the coop. The coop should be at least two feet high, and from two to three feet deep. The board in front may be turned up at night to prevent the young against rats, cats, etc., and should remain in the morning until the dew is off from the grass. The coop should be moved every two or three days to a clean place. The second engraving shows a coop of another construction, the tight apartment at the end with a slide door to let down every evening, keeps the little inmates secure from all enemies. A few auger holes must be made for ventilation. The front is a simple frame, with lath attached at sufficient distances to allow the chickens to pass through. The top should be made separate, and attached to the side by leather hinges.



CHICKEN COOP.—FIG. 2.

Feeding and Laying.—The best of feed sometimes fails to induce the hens to lay. This is not because the fowls do not get enough, but because it is not the kind they desire. It may be feed consisting of everything that serves to satisfy the demand for egg material, and yet no eggs will be the result. There are several causes for these complaints, one of the principal being the fact that a plentiful supply of pure fresh water is not always within reach, and unless water is plentiful the fowls will not lay. Water being the principal substance in an egg, it cannot be limited. Unless the water can be procured for the egg the fowl cannot lay. And in cold weather it must be so situated as to be either protected from freezing or else have a little warm water added to it occasionally. Now this is a troublesome job in winter, but water will freeze on cold days, and consequently is

useless to the fowls when in a frozen condition. The feed, however, even when of the best quality, may not give satisfaction. In that case, when no eggs are being derived, change it entirely for three or four days. Give something entirely different in the morning from that previously given, even if inferior, but still give whole grains at night in cold weather, for then the fowls go on the roost early in the evening, and have to remain in the coops until daylight, which is nearly thirteen hours, and so long a period demands the solid food in order to keep them warm during the long cold nights. Whole corn and wheat is best for them then, but in the morning any kind of mixed soft food makes a good meal for a change. The changes can be made by using good clover hay, steeped in warm water, after being chopped fine, slightly sprinkled with meal, and fed warm, which will be very acceptable. A few onions chopped fine will also be highly relished. Parched ground oats or parched cracked corn is a splendid change of food for a few days from the ordinary routine of every day. It stimulates them if fed warm, and is a good corrective of bowel complaints, especially if some of the grains are parched till burned. The matter of feeding is to give variety, and if the food is of good quality also, a good supply of eggs may be expected at all times, but with good quarters and plenty of water the prospects will be better.

Successful Poultry Raising.—Mr. Charles Lyman, a successful raiser of poultry, writes as follows: In raising poultry or stock of any kind, it should be the aim of every one to keep it healthy and improve it. You can do it very easily by adopting some systematic rules. These may be summed up in brief, as follows:

1. Construct your house good and warm, so as to avoid damp floors, and afford a flood of sunlight. Sunshine is better than medicine.

2. Provide a dusting and scratching place where you can bury wheat and corn and thus induce the fowls to take the needful exercise.

3. Provide yourself with some good, healthy chickens, none to be over three or four years old, giving one cock to every twelve hens.

4. Give plenty of fresh air at all times, especially in summer.

5. Give plenty of fresh water daily, and never allow the fowls to go thirsty.

6. Feed them systematically two or three times a day; scatter the food so they can't eat too fast, or without proper exercise. Do not feed more than they will eat up clean, or they will get tired of that kind of feed.

7. Give them a variety of both dry and cooked feed; a mixture of cooked meat and vegetables is an excellent thing for their morning meal.

8. Give soft feed in the morning, and the whole grain at night, except a little wheat or cracked corn placed in the scratching places to give them exercise during the day.

9. Above all things keep the hen house clean and well ventilated.

10. Do not crowd too many in one house. If you do, look out for disease.

11. Use carbolic powder occasionally in the dusting bins to destroy lice.

12. Wash your roosts and bottom of laying nests, and whitewash once a week in summer, and once a month in winter.

13. Let the old and young have as large a range as possible—the larger the better.

14. Don't breed too many kinds of fowls at the same time, unless you are going into the business. Three or four will give you your hands full.

15. Introduce new blood into your stock every year or so, by either buying a cockerel or settings of eggs from some reliable breeder.

16. In buying birds or eggs, go to some reliable breeder who has his reputation at stake. You may have to pay a little more for birds, but you can depend on what you get. Culls are not cheap at any price.

17. Save the best birds for next year's breeding, and send the others to market. In shipping fancy poultry to market send it dressed.

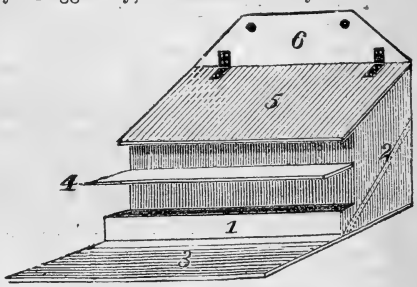
Fish for Poultry.—In preparing fish for fowls, we prefer to chop them up raw, add a very little salt and pepper, and feed in small quantities in conjunction with grain and vegetables; but for young chicks it is advisable to boil before feeding, and simply open the fish down the line of the back bone, leaving to the chicks the rest of the task. This food shall be given to layers sparingly, or we may perceive a fishy smell about the eggs, especially if the fish is fed raw. All who can will do well to try this diet for their flocks, and note its effect on egg production. We have always marked a decided increase in the rate of laying following an allowance of fish fed in moderate quantities.

There are hundreds of our readers who live near or on rivers or lakes, or the sea shore, where they can get considerable offal fish, such as are either too small to market, or are cast out as unfit to be sold. Hundreds of bushels of these fish are annually used for manure, either composted or plowed in direct. In this connection they are very good, though many a basketful could be put to better account by feeding them to your fowls; and they are very fond of this diet, though care must be taken not to feed it exclusively, for it may cause extreme laxity.

To Cure Pip.—This is a troublesome and somewhat fatal complaint to which all domestic poultry are liable; it is also a very common one. Some writers say it is the result of cold; others, that is promoted by the use of bad water. But, whatever the cause, the disease is easily detected. There is a thickening of the membrane of the tongue, particularly at the tip; also a difficulty in breathing; the beak is frequently held open, the tongue dry, the feathers of the head ruffled and the bird falls off in food; and if neglected, dies. The mode of cure which, if put in practice in time, is generally successful, is to remove the thickened membrane from the tongue with the nails of the forefinger and thumb. The process is not difficult, for the membrane is not adhesive. Then take a lump of butter, mix into it some strong Scotch snuff, and put two or three large pills of this down the fowl's throat. Keep it from cold and damp, and it will soon recover. It may, perhaps, be necessary to repeat the snuff balls. Some writers recommend a mixture of butter, pepper, garlic, and scraped horseradish; but we believe the Scotch snuff to be the safest, as it is the most simple.

Eggs and Pullets.—Unless you want a large proportion of cockerels do not sell all the largest eggs you can pick out. There are no means known by which the sex of eggs can with certainty be determined. Although many thought some sign indicated the sex, yet after repeated fair trials, all these indications have entirely failed with me, except the one which follows: With regard to the eggs of most of the feathered kingdom, if you pick the largest out of the nest, they are the ones that generally produce males, especially if they happen to be the first laid. Even in a canary's nest it is noticeable that the first egg laid is very often the largest, the young from it is the first out, keeps ahead of its comrades, is the first to quit the nest, and the first to sing.

How to Produce Layers.—Mr. L. Wright says: In every lot of hens some will be better layers than others. Let us suppose we start with six Houdans—a cock and five hens. Probably out of this five two may lay thirty eggs per annum more than either of the others; their eggs should be noticed and only these set. By following this for a few years a very great increase in egg production may be attained. My attention was drawn to this subject by a friend having a Brahma pullet which laid nearly three hundred eggs in one twelve-month, though valueless as a fancy bird, and the quality descended to several of her progeny; and I have since found other instances which prove conclusively that a vast improvement might easily be effected in nearly all our breeds were that careful selection of brood stocks made for this purpose which the fancier bestows on other objects. It is to be regretted more is not done in this way, and having more room than I had, I hope myself to make some experiments in this direction shortly. I will say now that I am perfectly certain the number of two hundred eggs per annum might be attained in a few years with perfect ease were the object systematically sought; and I trust these few remarks may arouse a general attention to it among those who keep poultry for eggs only, and who can easily do all that is necessary without any knowledge whatever of fancy points, or any attempt to breed exhibition birds.



GRAIN CHEST FOR FOWLS.

A Grain Chest for Fowls.—We illustrate an excellent grain chest for fowls. The trough (1), two inches high. The front of the chest extends downward no further than the top of the trough, thus leaving a free passage for grain from the chest into the trough. The dotted line (2) shows the position of a board in the chest, placed there to conduct the grain into the trough as fast as it is eaten out by the fowls. The platform (3) is for the fowls to stand upon while eating. It should not be wide enough to induce them to form a habit of sitting upon it. A board (4) is fastened to the front of the chest and extends over the trough to prevent filth from falling into it. The cover of the chest (5) should extend a little over the front, that it may be handily raised, and should rest inclined to prevent fowls from roosting on it. An extension of the back of the chest (6), with two holes in it, is provided so that it may be hung on corresponding wooden pins. If it is hung up in that way it will be necessary to put some kind of a key through each of the pins, to prevent its being jarred off from them. It should be hung so that the platform will be at least two feet from the floor. It may be made any length. A square chest, for a post in the yard, can be made on the same principle.

How to Fatten Turkeys.—Nothing pays better to be sent to market in prime condition than the turkey crop. Many farmers do not understand this. Their turkeys grow on a limited range, getting little or no food at home through the summer, and if fed at all with regularity it is only for two or three weeks before killing. I see these lean, bony carcasses in the local

markets every winter, and feel sorry for the owner's loss. They have received a small price for their birds and a still poorer price for the food fed out. The average life of a turkey is only seven months, and the true economy of feeding is to give the chicks all they can digest from the shell to the slaughter. If they get all they can eat on the range, that is well. Usually this should be supplemented by regular rations when they come from the roost in the morning and two or three hours before they go to roost at night. The food may be slack in the morning, so that they will go to the range with good appetites, and fuller at night. They should be put upon a regular course of fattening food as early as the middle of October, when you propose to kill the best birds at Thanksgiving. The younger and lighter birds should be reserved for the Christmas and New Year's markets. They continue growing quite rapidly until midwinter, and you will be paid for the longer feeding. There is nothing better for fattening than old corn, fed partly in the kernel and partly in cooked meal mashed up with boiled potatoes. Feed three times a day, giving the warm meal in the morning, and feeding in troughs with plenty of room, so that all the flock may have a chance. Northern corn has more oil in it than Southern, and is worth more for turkey food. Use milk in fattening if you keep a dairy farm. Feed only so much as they will eat up clean. Cultivate the acquaintance of your turkeys as you feed them. No more charming sight greets your vision in the whole circle of a year than a large flock of bronze turkeys coming at call from their roosts on a frosty November morning. New corn is apt to make the bowels loose, and this should be guarded against. There is usually green food enough in the fields to meet their wants in the fall, and cabbage and turnips need not be added until winter sets in. If the bowels get loose give them scalded milk, which will generally correct the evil. Well-fattened and well-dressed turkeys will bring two or three cents a pound more than smaller birds. It will not only be better for the purse, but for your manhood, to send nothing but finished products to the market.

Preserving Eggs.—Several Practiced Methods.—Several ways of preserving eggs are practiced. The object is to prevent evaporation from the egg. Cutting off the air from the contents of the egg preserves them longer than with any other treatment. An egg which has lain in bran even for a few days will smell and taste musty. Packed in lime eggs will be stained. Covered with a coat of spirit varnish eggs have kept so perfectly that after the lapse of two years chickens were hatched from them. A good egg will sink in a body of water; if stale, a body of air inside the shell will frequently cause it to float. When boiled, a fresh egg will adhere to the shell, which will have a rough exterior; if stale, the outside will be smooth and glassy.

Looking through a paper tube directed toward the light, an egg held to the end of the tube will appear translucent if fresh; but if stale it will be dark—almost opaque.

Spirit varnish for preserving eggs is made by dissolving gum shellac in enough alcohol to make a thin varnish. Coat each egg with this and pack, little end down, so that they cannot move, in bran, sawdust, or sand; the sand is best. Whatever is used for packing should be clean and dry. For preserving in lime, a pickle is made of the best stone lime, fine, clean salt and water enough to make a strong brine, usually sixty or sixty-five gallons of water, six or eight quarts of salt, and a bushel of lime are used. The lime should be slacked with a portion of the water, the salt and the re-

mainder of the water is added. Stir at intervals, and when the pickle is cold and the sediment has settled, dip or draw the liquid off into the cask in which the eggs are to be preserved. When only a few eggs are to be pickled a stone jar will answer.

At the Birmingham Poultry Show, England, prizes were offered for the best dozen preserved eggs that had been kept two months. The eggs were tested by breaking one of each set competing for the prize into a clean saucer, also by boiling one of each lot.

The eggs that had been preserved in lime-water, it was found on breaking them, presented cloudy whites. Eggs preserved by rubbing over with beeswax and oil showed thin, watery whites.

Eggs that stood best the test of boiling and which gained the first prize had been simply packed in common salt. These had lost little, if any, by evaporation, had good, consistent albumen, and were pleasant to the taste. The exhibit which took the second prize was served as follows: Melt one part of white wax to two parts of spermaceti, boil and mix thoroughly; or two parts clarified suet to one of wax and two of spermaceti. Take new-laid eggs, rub with antiseptic salt and fine rice starch. Wrap each egg in fine tissue paper, putting the broad end downward; screw the paper tightly at the top, leaving an inch to hold it by. Dip each egg rapidly into the fat heated to 100 degrees. Withdraw and leave to cool. Pack broad end downward in dry, white sand or sawdust. The judges were inclined to believe that had the trial been for a longer period than two months, this latter method would perhaps have proven the better of the two. The eggs were excellent, and on stripping off the waxed paper the shells presented the clean, fresh appearance of newly laid eggs.

The following is a recipe for packing in salt: Cover the bottom of a keg, cask, jar, hogshead, or whatever you choose to pack in, with a layer of fine salt two inches deep; upon this place the eggs, small end down, and far enough apart so that they will not touch each other or the sides of the receptacle; then put on another two inch layer of salt, then another layer of eggs, and so on until the package is full. This is the method that we used, and is on the whole the best method for housekeepers and for those who have only a small number to pack for market. The salt can be used over and over again.

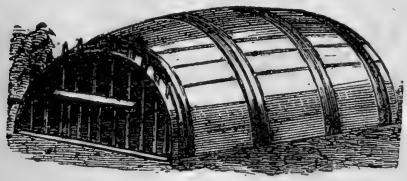
The following recipe is also given for keeping eggs: Put them in an open-work basket or colander and immerse them for a moment in boiling water; let them stay just long enough to form a film on the inside of the shell; this excludes the air. Then place them in some convenient vessel, small end down, and set them in the coolest part of the cellar, where they will keep till wanted for use.

Cheap Poultry Houses.—The following directions for building cheap poultry houses are clipped from W. H. Todd's descriptive catalogue:

We find the best and most successful plan to manage and make fowls pay is to scatter them over a large range in fields and orchards. For this purpose cheap, convenient, and comfortable houses are best. My plan is to build 16 feet long and 8 feet wide, 7 1-2 front (facing south), and 4 1-2 back, boarded upright and battened, with a shed roof, shingled. Sills are 2x4 inch-plank halved together. Plates, same size. Rafters, 2x2. Lay the sills on sleepers, and on these lay a tight floor, which cover with dry earth 4 to 6 inches deep, removing and renewing twice a year. This keeps fowls dry, warm and healthy. Place an entrance door near one end, on the front, and

at least two windows of six 8x10 lights. Partition across the middle, with a door. Fix ventilators at the highest point in each end, sheathed to exclude storm and wind. Erect roosts 20 inches high, for twenty fowls, with a movable nest or two, and a box, partly filled with dust and ashes, and you are ready for "business." Forty large fowls can be accommodated and thrive well. Since the house is double we are in shape for running two breeding yards. Fence can be built cheaply with lath nailed upright to two 1-inch-thick pieces, the lower one 8 or 10 inches wide, and the upper about 2, 30 inches apart; the lath may be 3 inches apart, and a short piece 16 inches long, tacked to the bottom board, and to a light strip running lengthwise the panel. It is best to make this fence in panels about 12 feet long. Set a post where they come together, and pass a wire around panels and post, fasten, and you have light, cheap, strong fences. The house can be made warmer if necessary by lining with tar-board sheathing.

An Inexpensive Chicken Coop.—A correspondent writes as follows: "Having made a good discovery, I am desirous of giving it to the people. Being engaged in raising chickens for profit, it was necessary to make cheap coops to keep them in for a few weeks. I take an old barrel and tack every hoop on each side of a seam between the staves with an inch wrought nail; after clinching the nail, I saw the hoops off on the seam. Then I spread the barrel open, as shown in the illustration, by cutting a board about twenty inches long for the back of the coop, and two small pieces to tack laths on for the front part. I have the upper section of the back fastened with leather hinges, so that I can open it at pleasure. Everybody has old barrels which are almost valueless, and the trouble and expense of making a coop of this description is so small that it is not worth mentioning, while to buy the material and make a coop of the same size, it would cost about one dollar."



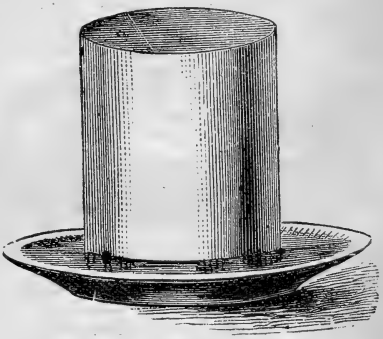
AN INEXPENSIVE CHICKEN COOP.

Chicken Cholera.—A New Jersey correspondent gives this remedy: Take of pulverized copperas, sulphur, alum, cayenne pepper and rosin, of each equal parts, and mix one teaspoonful in four quarts of meal. Give three days in succession, then once a week as a preventive. I have seen it used successfully. It will not cure those which have it, but will prevent spreading of the disease. For a disinfectant, use crude carbolic acid—one tablespoonful in one gallon of water. Sprinkle the hen house often, say about twice a week.

Another correspondent says: I used a strong tea made of white oak bark, which I used in the drinking water as a preventive. When a fowl was taken sick I used it pure, giving several teaspoonfuls at a time, four or five times a day. I have taken fowls so far gone that they were past eating or drinking, and cured them in a few days with this simple remedy. As a disinfectant I use crude carbolic acid, pouring it on a board in the chicken house and on the perches, coops, etc., or anywhere that the fowls frequent. If you will try this plan for awhile, removing all infected fowls from the flock, and keep the surroundings clean, I think you will soon get rid of the disease.

The following prescription we find in the *Southern Cultivator*, and it is said to be very efficacious in chicken cholera: Glycerine and water, each a half ounce; carbolic acid, ten drops. When the first symptoms of the disease are apparent, give five drops, and repeat at intervals of twelve hours. Usually the second dose effects a cure. A neighbor informed me that cholera was very destructive among his poultry, and at my suggestion he tried the foregoing recipe. He reports that the progress of the disease was promptly arrested, and in almost every case a cure was accomplished.

Infertile Eggs.—There are many reasons why eggs hatch so poorly, when from pure bred stock, one of the greatest being want of *stamina* in the flock from which the eggs came, caused by being kept too closely confined. As a rule it is best to procure eggs for hatching from fowls which have free range, which is a great promoter of healthfulness, though there is no reason why eggs should not hatch well when from fowls in confinement, *if* those fowls are given good care, plenty of food, and have good sized yards to run in. Want of fertility may be due to running too many hens to a cock; about ten hens of the Asiatics (Brahmas and Cochins), and from ten to fifteen of the laying breeds (Leghorns, Hamburgs, etc.) to a cock being about the right number to secure good results, other things being equal.



A CHEAP CHICKEN FOUNTAIN.

A Cheap Chicken Fountain.—Take an emptied tomato can, bend in the ragged edges where it has been opened, make a hole in the side one quarter of an inch from the edge, fill it with water, put a saucer on it, and quickly invert both. The water will then stand in the saucer constantly at the height of the hole. Chickens can drink, but cannot get in the water, which remains clean.

Chicken Lice.—The first signs of lice are with the early setting hens. From their nests soon a whole house will be overrun with the pest. Chicks show the presence of lice very quickly, and lice are certain death to them if they are not protected. Have all nests movable, and change the contents frequently. With sitting hen's nests be sure to have the nest clean and the box and surroundings whitewashed before she is placed. Whitewash and the dust box are the surest preventives of lice. Put two or three coats of whitewash on every interior spot in the building; the lice harbor in the crevices of the rough sidings, and on the under side of the perches. Let the fowl house have a dust box. Mix hot ashes with the dust occasionally to dry it. Do all this early in the year, before spring laying and sitting. Kerosene and lard when applied is a sure cure, but they are too often dangerous in their effects. A little castor oil on the head and under the wings of sitting hens is very effective. Don't keep a brood hen in a little coop without a dust wallow. If you want your fowls to be free from lice you must keep their habitation clean. The best way to do that is by occasional change of the nest contents and a thorough whitewashing of the apartment.

Raising Turkeys.—The difficulty of raising turkeys is a serious drawback to the profits of the business, but the exercise of care will obviate the difficulty. At first, and for about six weeks, turkey chicks are very delicate, so much so that even a warm shower will finish them. If they can be kept alive for about two months they begin to assume a more robust character, and will soon become the very hardiest of poultry. The chicks, therefore, should be provided with shelter, and the shed which furnishes this would be all the better if it had a wooden floor. The best feed for the first week is hard boiled eggs, mixed with minced dandelion. It is thought the dandelion serves to keep the bowels in order. At all events the young birds prefer dandelion to all other green food. At the end of the first week add gradually to the boiled eggs bread crumbs and barley meal, constantly lessening the amount of egg until at the end of three weeks it may be entirely discontinued. Now give boiled potatoes as a part of the food, and a small portion of some small grain may be added, in fact making the food very much like that of other poultry. If fed in this way and kept dry, they will come along all right.

How to Raise Ducks.—A writer who thinks unlimited water a bad thing for young ducks, recommends the following treatment for them: "Ducks are easily hatched, and, if properly managed, they are easily raised—much more so than chickens or turkeys. Probably the worst thing for ducklings is the first thing they usually receive, and that is unlimited range and water to swim in. The little things are, in a measure, nude, and should be kept in pens with dry soil floors or stone pavements that can be washed down daily. No kind of poultry will succeed on bare boards. All the water they need is best furnished by burying an old pot in the ground and laying a round piece of board on top of the water with room for the ducks to stick their heads in and fish out the corn that is put in the water. This amuses them and does no harm, while, if allowed to go off to ponds or streams, they are very liable to fall a prey to vermin in some shape, or to get their bodies wet and chilled from remaining too long in the water. Their pens must be kept clean if they are expected to thrive.

Gapes in Fowls.—The parasite that causes gapes in fowls is of a red color and about three-quarters of an inch long. The remedies are numerous, but chiefly consist in removing the worms. One way is to moisten a feather from which all but the tip of the web has been stripped, with oil, salt water, or a weak solution of carbolic acid, introduce it into the windpipe, twist it around once or twice, and then withdraw it. A teaspoonful of sulphur mixed with a quart of corn meal and water, and fed to the fowls morning and evening, is also a good remedy.

The *Poultry World* says: As soon as we discover any symptoms of gapes among our chickens, we know that there are worms—very small red worms—in their windpipes, and we give them camphor in their drinking vessels strong enough to make quite a taste of the camphor. Then, if any get the disease quite badly before we discover it, we force a pill of gum camphor down the throat, about the size of a small pea, and the fumes of that dose will kill the worms. No kind of worms can live in camphor; hence, camphor must be a powerful vermifuge.

A Connecticut poultry raiser writes: "Perhaps some who raise fowls will be interested in my experiment tried last season on a chicken with the gapes. I gave it about a quarter of a teaspoonful of kerosene, and as it seemed bet-

ter for a day or two, I repeated the dose, giving nearly one half a teaspoonful for the second time. The chicken was about the size of a robin at the time, but is now full-grown, weighing several pounds. I cured chickens affected with a disease we thought cholera, by giving powdered alum dissolved in water."

Eggs.—How Increased.—If an increase of eggs be desired in the poultry yard, before large sums are expended in the purchase of everlasting layers, we would recommend the system of keeping no hens after the first, or at most, after the second year. Early pullets give the increase, and the only wonder is that people persist, as they do, in keeping up a stock of old hens, which lay one day and stop the next. In some parts of Europe it is the invariable rule to keep the pullets only one year. Feeding will do a great deal—a surprising work indeed—in the production of eggs, but not when old hens are concerned; they may put on fat, but they cannot put down eggs. Their tale is told, their work is done; nothing remains to be done with them but to give them a smell of the kitchen fire, and the sooner they get that the better.

Late Chickens.—Late chicks may be more profitable than early ones. Chickens from eggs set in August and September may be kept warm in a tight, glazed house, and fed so that they will grow continually through the winter, and if they come later all the better, if they are well kept and fed. The early broods will be salable at good prices, when the market is bare of chickens, and the later ones will furnish spring chickens long before the usual supply comes to hand. Spring chickens hatched in fall, or even in winter, are rare, but not entirely unknown to a few persons who made the discovery that with good feed, warm quarters, a warm mess at least once a day, warm drink and cleanliness, there is no difficulty at all about raising them, and at a good profit.

Cure for Scaly Legs in Fowl.—A sure cure of scaly legs in fowl is effected thus: Insert a feather in the spout of a coal oil can so that too large a stream will not run out; get some one to hold the fowl by the wings; take hold of a toe of one foot at a time, and pour a fine stream from the hock joint to the end of each toe, taking care that all parts of the foot are wet with it. One application a year is enough, if done at all, and at the time when they need it, say during January or February. The scaly appearance is caused by an insect, which the oil most effectually kills, and leaves the legs clear and bright looking. This will answer even when the legs are twice their natural size, which is frequently the case when neglected.

Roup.—Fowls exposed to dampness in severe weather are apt to take cold, which often culminates in roup. The writer has cured this disease by injecting kerosene into the nostrils by the means of a bulb syringe, and then using it to gargle the throat. The latter is effected by holding the throat close enough to prevent swallowing, and, after the gargling, pouring the liquid out on to the ground. Repeat this once the next day; then feed with boiled rice and scalded milk, keeping water away for a few days.

To Get Rid of Skunks.—To rid your poultry yard of skunks, purchase a few grains of strychnine, roll it up in a ball of lard, and then throw it at night outside the yard, where the animals' tracks are seen. As they are very fond of lard, they will swallow it quickly, and in the morning you will

find your enemy dead. But you must be careful to shut up the dogs and cats, as they are equally fond of lard. It is the easiest way to kill any vermin, as they die very soon. Skunks will kill and eat full-grown ducks and hens, and suck their eggs, whenever they can gain entrance into the poultry-house.

Road-dust for the Hennery.—Collect a few barrels of dry earth, road-dust, fine dry dirt in the cornfield or potato patch, or anywhere that is most convenient. This is a handy thing to have in the fall and winter for sprinkling under the roosts and on the floor of the poultry-house. It absorbs ammonia, keeps down smells, and keeps things ship-shape. It will pay to attend to this when it can be so easily done. It costs but little, and is a real advantage.

The Langshans.—There is a prominent feature of the Langshans not possessed by the Black Cochins, which is activity. They come in as an extra desirable breed, between the leghorns and the sitters, for they commence to lay early, and when about to enter upon incubation are easily broken. They are large in size, fine-boned, hardy, and grow rapidly. They are the strongest rivals for public favor that the Plymouth Rocks have, and are just as certain to go to the front as if they had been known for centuries. Their qualities as a farmer's fowl are good, and they will entirely supersede many other breeds in time.

Poultry Manure.—Collect the droppings as often as possible, and compost them with dry dirt. If dry dirt is inconvenient on account of the earth being frozen, use good ground land plaster instead. The mixture of ground plaster and poultry droppings is better than either alone, and the ammonia is thereby saved. A good dusting of plaster over and under the roosts, and plentifully scattered all over the floor of the poultry house, conduces to the health of fowls and destroys foul odors.

How Nests Should be Made.—Eggs hatch much better if the nests are made by placing a cut turf, and shovel of mold, sand or ashes in the box or basket, and on this a little short straw, than if straw only is used. In this way a convenient hollow is obtained that prevents the eggs rolling out from under the setting hen. In cool weather the eggs are thus kept of a much more equable temperature than in nests made simply of loose straw.

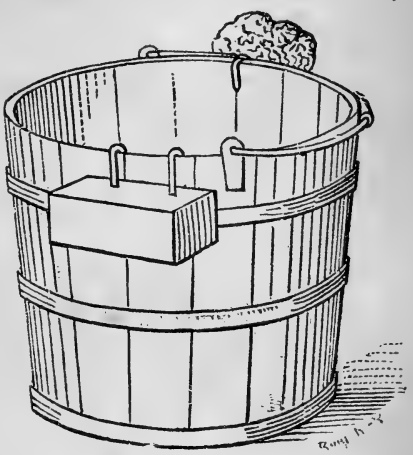
To Fatten Geese.—To fatten geese, an experienced practitioner says: Put up two or three in a darkened room and give each bird one pound of oats daily, thrown on a pan of water. In fourteen days they will be found almost too fat. Never shut up a single bird, as geese are sociable and will pine away if left alone.

Nests of Sawdust.—To prevent hens from scratching their nests make the nests of sawdust. Do not have the boxes too large—only long enough for two nests, with a partition. Place a little hay on the sawdust until the hens get accustomed to it; also sulphur, to prevent vermin.

Hens Eating Eggs.—If hens get into the habit of eating eggs, take enough bran and corn meal of equal parts for one feeding, and enough vinegar warmed to make the meal wet enough for the hens to eat. Mix together and feed it to the hens.

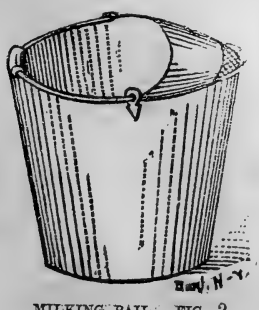
THE DAIRY.

Apparatus for Milking.—Absolute cleanliness in milk is as much to be desired as in any other article of food. We fear that farmers and dairymen, as a rule, do not give as much attention to this matter as it really requires. We present herewith an illustrated article on this subject from the pen of a practical dairyman, which we consider worthy of attention, and trust that many will profit by its suggestion:



DAIRY PAIL.—FIG. 1.

"Every reasonable person desires to have his or her food perfectly clean. Milk and dairy products are not always clean, to put it very mildly, and the filth that finds its way into milk is of a very disagreeable, if not unwholesome, kind. As a large portion of the milk of a family cow—and much of that sold—is used by children, owners of cows should be excessively careful to have the milk perfectly clean and pure. This is easy to be done if it is desired. It requires only the determination to do it, and a very little attention. The cow is not a cleanly animal, by any means, and some cows seem to delight in making themselves filthy. One of my best cows will take pains to lie down directly in her droppings, so that the udder is always besmeared, and other cows are very careless about it, at the best, so that it is necessary that a part of every milking apparatus should consist of a pail of water, a sponge and towel. Before the cow is milked the udder should be washed and wiped dry. For this purpose I have used a pail arranged as shown in the engraving (Fig. 1), which is taken to the barn at every milking. Previously the stable-man has brushed and carded the cows, and has cleaned and sanded or littered the floor, so that there is no coarse filth to remove, and only the remaining smears. But if these are left on the teats, the filth will get into the pail in

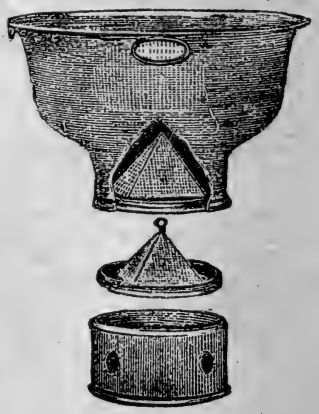


MILKING PAIL.—FIG. 2.

spite of all efforts. The pail has a hook on one side upon which the sponge is carried, and a box on the other, in which an old towel or pieces of cloth are kept. With these the udder and teats are washed and dried before the cow is milked. The time used—not lost—is well spent.

"The milking pail should be provided with a strainer, and I have found none made for sale free from some objection, either as regards the difficulty of cleaning or durability. I have my pails made to order with the strainer upon the half cover of the pail at the edge, and with a lip at the edge to cause the milk to flow easily. (See Fig. 2.) There is no difficulty in washing this pail, the wire gauze cannot be broken in the washing, and it is perfectly cleaned with ease. Hairs *cannot* be kept out of milk at some seasons, and a fine hair carried lengthwise *will* pass through the finest wire cloth. It is therefore necessary to use precautions in straining. A hair will not pass through a cotton cloth, and in straining milk into a deep pail I use the strainer shown at Fig. 3, which has a piece of washed, somewhat coarse and thin, white muslin, fastened around the bottom hoop. This causes the milk to pass through three strainers at one time, which is sufficient. Where the milk of several cows is strained, the strainer should be rinsed after each use, otherwise the after milk passes over all the impurities gathered in the strainer. For shallow pans the double strainer, Fig. 4, is excellent. The middle strainer fits closely into the bottom of the basin over the fixed strainer, and the basin rests in the perforated hoop which stands in the milk pan. A cloth may be tied over the top of the basin if thought proper. With all these precautions the most complete cleanliness is within easy reach, and if the cow is healthy and well fed, the most fastidious person may drink the milk without any apprehension. While it is so easy to be clean the conscientious dairyman need have no excuse for violating propriety, and excuse himself by the idea that it can't be helped.

STRAINER.—FIG. 3.



DOUBLE STRAINER.—FIG. 4.

"Every dairy utensil should be of tin. No wooden vessel should be used in milking, as the wood absorbs the milk, which sours in the pores and there curdles, and every particle of curdled milk, whether effected by rennet or by acidity, like the leaven of yeast, is an active agent for souring other milk. As curd of milk is hardened by heat and made insoluble, dairy utensils should first be washed with cold water and soap, and when thoroughly well cleaned they may then be scalded. Curd is dissolved by alkali, and the free alkali of the soap not only removes the grease of the milk, but also any particles of milk which by an accident may have been retained in a crevice or corner,

and there soured or curdled. To make the cleaning of dairy vessels more easy, it is well to have no sharp corners, but to have all the joints made round, and this may be done easily if one has the milk pails made to order."

Milk Cooler.—There are quite a number of devices for this purpose, and some of them are too complicated, which must always be a serious objection. Our engraving represents an English milk cooler, which is heartily commended. In this apparatus a very small quantity of cold water, passing upward in a very thin stream between two corrugated sheets of metal, rapidly abstracts the heat from two shallow streams of milk descending outside the metal sheets (Fig. 1). D is the inlet and F the outlet of the water, which, being supplied from a higher level, flows through the refrigerator (B) by the force of gravity. A tap of the milk receiver (A) regulates the flow of milk into a small trough at the top of the refrigerator, punctured with holes, through which the milk runs, and is spread into so fine a sheet that, instead of falling rapidly from step to step, it follows the corrugations of the surface. In the enlarged section (Fig. 2) of a part of the refrigerator the descending arrows indicate the current of milk gradually cooling as it descends. The current of water passing upward is warmed, so that when it passes out of the spout at F it is very nearly of the same temperature as the milk in the receiver. This device appears to be quite simple.

MILK COOLER.—FIG. 1.

MILK COOLER.—FIG. 2.

How to Make Good Butter.—Be sure the pasture is of the best, and that it contains a variety of the sweetest grasses. Do not change from winter feed to spring pasture too suddenly, and, particularly, do not turn out your cows too early to shift for themselves. Let the milking be done by quiet persons, whether male or female, at regular times morning or evening, knowing always that the milking is conducted as cleanly as it is quietly.

Know that the utensils for holding the milk are of the best description and always scrupulously clean.

See that the milk is perfectly cooled to free it of animal odor. A thermometer is an absolute necessity in all well regulated dairies.

Be sure the room for setting milk is cool, and so it may be darkened at will. Thorough ventilation is one of the golden rules in dairying. The temperature of the dairy room should never be more than sixty degrees, nor less than forty degrees.

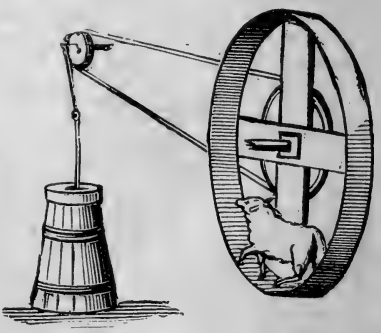
Skim the milk as soon as the first indications of getting thick from lopper are shown. Turn the cream slowly into the jar, and stir thoroughly when more cream is added. Keep the receptacle for the cream cool, from fifty to sixty degrees, and cover with some fabric that will keep out minute insects, and at the same time allow access of air.

POWER FOR CHURNING.—FIG. 1.

Churn when the cream is ripe, that is, when the cream is sour, every day in spring, and every day in summer. Do not allow the cream in the churn to rise much above sixty degrees. Do not churn too fast. There is nothing gained by seeking to bring the butter in a few minutes. From twenty to thirty minutes is about right.

Good grass will make nice colored butter. At such seasons, when the color of butter is pale, use coloring carefully. It is better that butter be rather light than a dark yellow.

When the butter comes in granules, stop churning. Wash with cold water or cold brine; work only enough to bring it to a firm uniform mass. Do not salt heavily; from three-quarters to one ounce of salt to a pound of butter is enough. Pack in tight, clean, sweet packages; fill to within a half inch of the top, cover with a clean cloth, and add brine to fill until sold. Keep it in the coolest place you have, and there is no reason why you should not get the top prices for your butter.



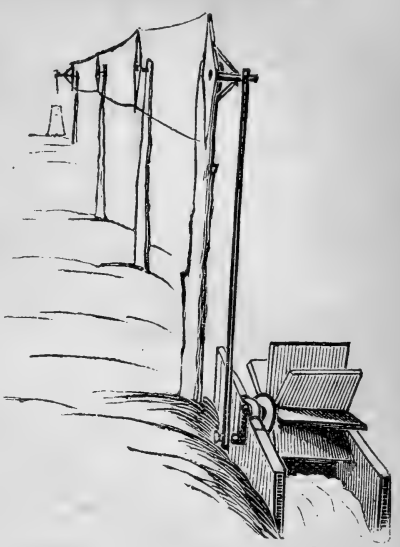
POWER FOR CHURNING.—FIG. 2.

Power for Churning.—We present four illustrations, with brief descriptions, showing practical methods for labor saving in the usually tiresome and monotonous business of churning, from which may be gleamed some valuable hints.

Fig. 1, although not a power churn, is, nevertheless, a labor-saving arrangement. It is simply a hickory sapling about twelve or fourteen feet long, fastened firmly at the butt end, while at the other end is fixed a seat in which a child can sit and perform the work with more ease than a grown person in the ordinary way. The dash of the churn may be fastened at any

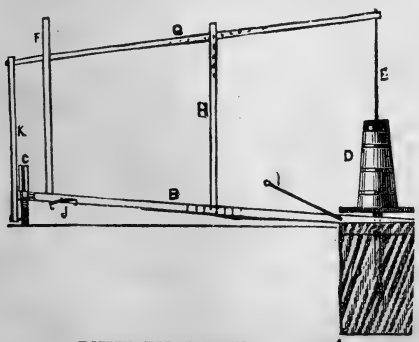
point to accommodate the spring of the pole. Fig. 2 is a vertical wheel with a rim about two feet in width, on the inside of which the animal treads. It is necessary to have this wheel as much as eight or ten feet in diameter. The engraving gives ample insight into its mechanical construction.

Fig. 3 is a water-power churn, showing the water wheel fitting easily into the box or flume, at the outlet of the dam, or it may be simply placed in a swift-running brook, as it does not require much power or speed. The wheel should be about three feet in diameter. The power can be transmitted any distance by means of two wires fastened upon poles with swing trees that receive a backward and forward motion from the crank of the water-wheel.



POWER FOR CHURNING.—FIG. 3.

Fig. 4 represents a cheap churn power, which is both simple and practical. A is a log, squared and set in the ground far enough to be solid. B is the sweep—a four-inch scantling sixteen feet long, with a two-inch hole in one end and an axle on the other, and holes in the center for the standard, according to the length of the dash. C is the drive-wheel, eighteen inches in diameter, three inches thick. D, the churn, which stands still on a small one-legged table, with the leg running through the sweep (B) and into the stationary block. This arrangement gives the dasher (E) two motions, and causes the butter to "come" in shorter time. F, beam guide; G, beam; H, standard; I, hitching stick; J, whiffletree; K, pitman. It is very easy to operate.



POWER FOR CHURNING.—FIG. 4.

Hard Churning and Blue Cream.—It is a very common thing for a person with one cow to complain that her cream will not churn, or that it churns with great difficulty. The reason is the cream is kept so long to get a churning that it becomes too sour. Putting in either

bicarbonate of soda or sal soda will reduce the acid and help the butter to come, but the butter thus made is always inferior. The remedy is to churn oftener, say every other day, or if the weather is a little cool, twice a week, and to put in milk to make sufficient bulk for churning. The skimming, too, should be done early—as soon as the cream is all up, or pretty near all up. It is better to take in the top of the milk in which the last rising of the cream lingers, than wait for the milk to get stale before removing the cream. The practice which many people follow of letting the whey start on the milk before skimming or on the cream before churning, is to a high degree detrimental both to the churning and to the quantity and quality of butter. If easy churning is desired, the cream must be churned while it has a fresh and new taste—not later than the first stage of sourness.

The "blue or moldy-looking cream" is not peculiar to any breed, and it occurs in the milk of all cows if they and their milk are improperly cared for. The cream of any milk may take on a dark or moldy appearance if too long exposed to light and to a damp atmosphere. It is more easily induced in the milk of cows which, from any cause, have had their blood heated, or by exposure to hot sun, by too fast or too much driving or from feverishness by excessive feeding, etc. Milk inclined to have flecks in its cream is very easily made to assume a moldy condition, for the dark color is derived from an actual fungus which develops in the milk and cream. An unusually ready development of it is evidence that the cow is in some way sick—from over feeding or other causes. There is always in milk a variable quantity of albuminous matter which turns dark-colored upon exposure to air and light, but it is heavier than cream and heavier also than the serum of milk, and is inclined to settle to the bottom. This has probably no connection with dark-colored cream; it is more likely the result of unfavorable health and dampness of cellar.

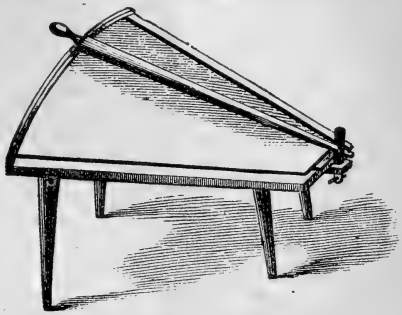
To Keep Butter.—It is said that a compound of one part sugar, one part nitre, and two parts of the best Spanish salt, beaten together into a fine powder and mixed thoroughly with the butter in the proportion of one ounce to the pound, would keep the butter in every respect sweet and sound during two years. It is also said to impart a rich marrowy flavor that no other butter ever acquires, and tastes very little of the salt.

Cream and Cold.—It has been discovered by a French scientist that the rising of cream is quicker, and its volume greater, the nearer the temperature is to that of freezing water; further, that the yield of butter is greater, and the skim milk, butter and cheese are all of the better quality under like conditions. These facts should be worth the attention of dairy keepers.

Waterproof Butter Wrappers.—At the Pennsylvania State Fair in 1882 waterproof butter wrappers attracted considerable attention from dairymen. Advocates of the waterproof paper claim for it that, being air-tight, it preserves the freshness and flavor of the butter, and is about one-sixth as expensive as cloth.

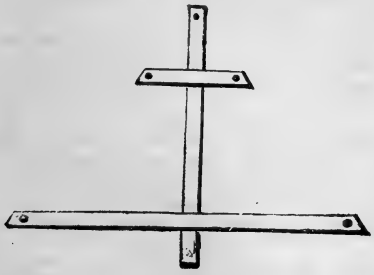
To Restore Rancid Butter.—Rancid butter can be restored by first washing it thoroughly in cold water, then to every one hundred pounds add two pounds pulverized sugar, two ounces powdered saltpetre, and salt to suit.

An Improved Butter-Worker.—This butter-worker consists of a table of maple (Fig. 1), or other hard sweet timber, in the form shown in the engraving, with three feet sides and six feet on curve, without side pieces. At each edge is a deep groove to conduct the brine. At the front end is a rim, projecting one-half inch above the plank. At the lower end is a deeper cross-groove, with outlet at one side of the projecting bed-piece. In this bed-piece is loosely set a post with a round tenon fastened by a pin beneath. In this post is set the lever, so loosely as to admit of lifting the handle of the lever a foot or more. This lever is held in the mortise by a pin, and sets one-eighth of an inch above the table at the post; is of maple, four inches wide and three inches thick; lower side square cornered plain, upper side rounded or cornered. The handle is wrought at the upper side, leaving a shoulder below, which sets just within the rim of the table.



IMPROVED BUTTER-WORKER.—FIG. 1.

Fig. 2 shows the frame-work of the table, into which the legs are formed. The entire cost of this butter-worker will not exceed $3. The operation, which differs from that of other workers in use, consists of pressing the butter with a direct vertical pressure—no grinding strokes allowable. Then strike the left side of the butter with a right upward motion of the lever a few strokes, and it lies in a roll parallel to the lever. Now turn the roll at right angles to the lever, and continue the three operations of pressing, rolling, and turning, until it is sufficiently worked.

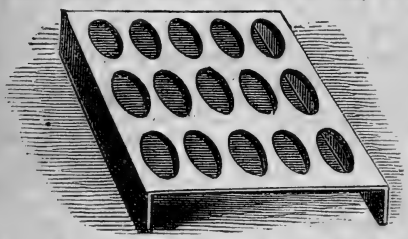


IMPROVED BUTTER-WORKER.—FIG. 2.

French Butter Making.—In the French system the butter is made from very sour cream, is washed in the churn, not salted, but sold for present use in Paris and England, and the keeping quality is not much studied. Notwithstanding the extreme sourness of the cream when churned, the butter has almost the same appearance as that made from sweet cream—this is the result of the washing. The finest French butter is shipped at once to the consumers, and generally consumed before the end of three days; so its keeping qualities are not material. No salt is used for the home market. It is put up in large balls of 28 lbs. to 40 lbs., each ball being covered by a piece of fine flannel and placed in a willow basket. Second and third-class butter is made up in one pound rolls and packed in grape leaves. For the English market, butter is put up in one pound rolls and covered with jaconet and lace paper, and packed in small boxes 14x9x6 inches, twelve

rolls in each box. M. Lepelletier is the largest exporter of this kind of butter, and is said to ship 1,200 boxes per week, his trade amounting to 12,000,000 francs per year. It is sent in refrigerating cars. In Paris all butter is sold by auction at ten markets. Women are mostly the buyers. Three or four hundred lots are sold every hour. Sworn officials weigh and register the butter, and make up the accounts of sale. The different kinds of butter are named from the places where they are made, and classified according to quality. The best butter is sold at 50 and 75 cents per pound.

Preparing Butter for Market.—After the milk has been kept in the spring or cooling house about forty-eight hours, it is then taken out and skimmed, and after the butter is made it is put up in half-pound prints for market. It is shipped in boxes, having an ice chamber in the center. The boxes are 31 by 16 1-2 inches and 15 inches deep. The ice chest is of tin, placed in the center of the box, and is 16 1-2 by 5 inches, 15 inches deep. At the bottom there is a hole, which extends also through the box, for the escape of water from the ice as it melts. Movable shelves with cleats on the edges, are fitted in each side of the ice chest, one above the other, for holding the prints. The box holds 10 shelves, 5 on each side of the ice chamber, and the shelves, when in place, leave a space between each of 2 1-2 inches. We give a rough draft of the movable shelf in our illustration. Each shelf holds 20 prints, or 10 pounds of butter. In packing the butter a plain board is used to receive the prints at the bottom of the box; then the shelf, as illustrated, is placed on top, and thus continued until the whole number of prints are in. A movable shelf just coming to the top of the box is placed over the top prints, so that when the lid of the box is brought down it presses tightly on it and thus keeps the shelves from shaking and prevents any injury to the prints.



MOVABLE SHELF FOR HOLDING BUTTER PRINTS.

Keeping Butter for Winter Use.—Good butter put up after the following directions will keep in sound condition one year: Use for a package a tub somewhat tapering, with heavy staves and heads provided at both ends, so as to make a package that will not leak. In packing the tub is turned on the small end, and a sack of cotton cloth is made to fit the tub, and into this the butter is packed until it reaches to within an inch of the groove for holding the upper head. A cloth is next laid upon the top of the butter and the edges of the sack brought over this and neatly pressed down; then the head is put in its place and the hoops driven home. The package is now turned upon the large end and the sack of butter drops down, leaving a space on the sides and top. Strong brine is then poured into a hole in the small end and until it will float the butter. The hole is tightly corked and the butter is pretty effectually excluded from the air. Where only a small quantity of butter is to be preserved, pack it in self-sealing fruit jars. By this plan a little brine is put into the jar, which is then packed not quite full of granulated butter. Some bleached muslin is laid over the butter, then the little

place above filled with salt, and finally enough strong brine, made from butter salt, poured in to fill the can. When packing roll butter in jars the brine should be made strong enough to bear an egg. To three gallons of this brine add a quarter of a pound of white sugar and one tablespoonful of saltpetre. Boil the brine, and when it is cool strain carefully. Make the butter into rolls and wrap each roll separately in white muslin cloth. Pack the jar full, weight the butter down, and submerge in brine.

Suggestions in Milk-Setting.—Professor L. B. Arnold says:

First—To make the finest flavored and longest-keeping butter the cream must undergo a ripening process by exposure to the oxygen of the air while it is sweet. This is best done while it is rising. The ripening is very tardy when the temperature is low.

Second—After cream becomes sour, the more ripening the more it depreciates. The sooner it is then skimmed and churned the better, but it should not be churned while too new. The best time for skimming and churning is just before acidity becomes apparent.

Third—Cream makes better butter to rise in cold air than to rise in cold water, but it will rise sooner in cold water, and the milk will keep sweet longer.

Fourth—The deeper milk is set the less airing the cream gets while rising.

Fifth—The depth of setting should vary with the temperature; the lower it is the deeper milk may be set; the higher, the shallower it should be. Milk should never be set shallow in a low temperature nor deep in a high one. Setting deep in cold water economizes time, labor and space.

Sixth—While milk is standing for cream to rise the purity of the cream, and consequently the fine flavor and keeping of the butter, will be injured if the surface of the cream is exposed freely to air much warmer than the cream.

Seventh—When cream is colder than the surrounding air, it takes up moisture and impurities from the air. When the air is colder than the cream, it takes up moisture and whatever escapes from the cream. In the former case the cream purifies the surrounding air; in the latter, the air helps to purify the cream. The selection of a creamer should hinge on what is most desired—highest quality, or greatest convenience and economy in time, space and labor.

First Principles in Butter Making.—Butter is *finished* in the dairy, but *not made there*. The stamp of the dairywoman puts the gold in market form; but the work must be commenced in the field or in the feeding stables; and this leads at once to the consideration of feeding for butter. During the early, sunny summer month, when nature is profuse of favors, there is little to be done beyond accepting her bounty. The tender grasses are full of the needed nutrition, and they afford the constant supply of moisture without which the secretion of milk is greatly lessened. Yet, at this season, as well as all others, a pure supply of water is absolutely necessary. It does not meet the requirement if cattle have a wet hole full of surface drainage in the pasture, or a frog pond. While it is not probable that the tadpoles and wrigglers sometimes found in city milk have been drunk by thirsty cows, many infusions do exist in such pools that are hardly eliminated or rendered entirely harmless by the wonderful milk secretions of the animal. The cattle should drink from spring-fed boxes; and as often as these, under the hot sun, are seen to produce green growth or floating scum a pail of coarse salt may be put in, and the current checked until the fresh-water growths are

killed; the salt water is then drawn off, and for a long time the trough will remain pure and the water bright.

Bitter Milk.—Bitter milk is a matter of frequent occurrence every fall and winter, or soon after the cows are off from grazing. It is caused, first, by bitter herbs in the hay—such as May weed, rag weed, John's wort, etc.—and also by the use of too much over-ripe food, such as straw, corn stover, or late-cut hay. It never occurs when cows are fed on good food, and are thriving, or even holding their own, and are kept comfortably warm. It can be avoided, first, by correcting the error in feeding and exposure; and, secondly, by scalding the milk when it is first drawn, by setting it in pans over a kettle of boiling water till the skin which forms on its top is well wrinkled, and then setting it away to cool for the cream to rise. This treatment will drive out the cause of the bitter flavor, and improve the butter and make it easy to churn.

Borax for Salting Butter.—The Italian minister of agriculture addressed a communication to the chamber of commerce of Milan relative to experiments in salting butter with borax which have been carried out at the agricultural station at Florence. From the account which appears in the *Giornale di Agricoltura*, borax would appear to have a most marvelous effect in insuring its absolute preservation. Samples of fresh butter made at the Florence station, and purposely not carefully freed of their buttermilk, were found, on the addition of about eight per cent. of borax, to maintain their natural fine flavor, without the least change whatever, for upward of three months. To attain this satisfactory result, it is necessary that the borax should be perfectly dry, and in a very fine powder, and care must be taken to its thorough mixture with the whole mass of the butter operated on. Among the further advantages of this plan, it is noted that borax imparts no flavor of any kind to the butter, while it is entirely harmless in its nature, and also reasonably cheap. Still later experiments have shown that a very much smaller proportion of borax suffices to produce the desired effect, and also that simple solutions of the salt act quite as well as the dried powder.

Don't Flavor Your Butter too Much.—It is too true that unless we adopt the improvements of the day and look carefully after our interests, we shall be left in the background as to quality and profit. But why is it that western creamery butter brings a better price? We are told it is because of its uniformity of quality. The butter is made from day to day, from week to week under the same conditions, and always free from anything that would impart unpleasant flavors. Milk set in a farmer's kitchen or in any place where it will absorb unpleasant odors from cooking vegetables, from tobacco smoke or from clothing fully charged with the odor of the stables, cannot make butter free from unpleasant flavor. We complain of low prices received when we ourselves are to blame. The flavor of the butter is affected by the feed of the cows. We lay the blame at the door of the dairy woman, when he who feeds the cows is responsible.

To Color Butter.—As a rule, it is absolutely essential in the winter to color butter in order to make it marketable, or at all attractive as an article of table use at home. There may be a possible exception to this rule, in cases where cows are fed largely upon yellow corn, pumpkins, carrots, etc., but this does not lessen the importance of the rule. Of the various substances used in coloring butter, we think that carrots (of the deep yellow

variety) give the most natural color and most agreeable flavor. Annatto, however, is principally used, with most satisfactory results. If carrots are used, take two large-sized ones, clean them thoroughly, and then with a knife scrape off the yellow exterior, leaving the white pith; soak the yellow part in boiling milk ten or fifteen minutes. Strain boiling hot into the cream; this gives the cream the desired temperature, colors it nicely, and adds to the sweetness of the butter.

How to Detect Oleomargarine.—A Frenchman points out in a note to the Belgian Academy a simple way of distinguishing between natural and artificial butter, based upon the different behavior of the two substances when exposed to a temperature of from 150 degrees to 160 degrees in a capsule or test tube. At this temperature artificial butter produces very little froth, but the mass undergoes a sort of irregular boiling, accompanied by violent jerks, which tend to project some of the butter out of the vessel. The mass grows brown, but this is by reason of the caseous matter separating into clots on the walls. The fatty portion of the sample sensibly retains its natural color. Natural butter, on the other hand, at the same temperature, produces abundant froth, the jerks are much less pronounced, and the mass grows brown, but in a different way. A good part of the brown coloring matter remains in suspension in the butter, so that the whole mass has a characteristic brown look. All natural butter behaves in the same way.

Firm Butter Without Ice.—In families where the dairy is small, a good plan to have the butter cool and firm without ice is by the process of evaporation, as practiced in India and other warm countries. A cheap plan is to get a very large-sized, porous, earthen flower-pot, with a large saucer. Half fill the saucer with water, set it in a trivet or light stand—such as is used for holding hot irons will do; upon this set your butter; over the whole invert the flower-pot, letting the top rim of it rest in and be covered by the water; then close the hole in the bottom of the flower-pot with a cork; then dash water over the flower-pot, and repeat the process several times a day, or whenever it looks dry. If set in a cool place, or where the wind can blow on it, it will readily evaporate the water from the pot, and the butter will be as firm and cool as if from an ice-house.

THE APIARY.

Wintering Bees.—For the benefit of those who are interested in the subject of bee-keeping, we present herewith an illustrated article upon wintering bees, the suggestions in which we think will be found both valuable and timely.

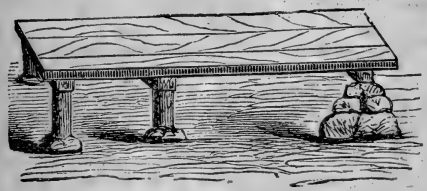


FIG. 1.—PLATFORM.

Prepare, of any sound matched flooring, a platform nailed to 2x4 or 3x3 joists. When ready, set it upon blocks or stones, and it will appear as shown in Fig. 1. On this you are to put the bee hives, eight in number, and arranged as stated further on; also a north-end board, two side boards, a south-end board and a movable cover or roof. The arrangement of your hives should be as shown in Fig. 2, where *a* is the north-end board, made square, but with cleats, as in the next figure; and *b b* are two hives with their entrances facing the south; *c c c* are three hives with their entrances to the east; *d d d* are three hives with their entrances to the west. The object of this arrangement is to vary as far as possible the entrances, that the bees be less confused when they fly out in winter. Experience shows that most of them find out their own hives by this arrangement.

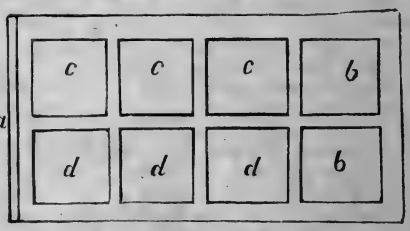


FIG. 2.—ARRANGEMENT OF HIVES.

FIG. 3.—INSIDE OF END PIECE.

Fig. 3 shows the inside of the north-end piece of the boxing about the hives, the outside of which is perfectly plain, and *a a* are two cleats that hold the boards together, with the square wall cleat at the bottom and the longer cleat close by the first cleat, the three cleats making an inch space, marked dark, which dark places allow the side pieces to rest in and be held to the north piece. Fig. 4 shows first the outside of the south-end piece, and that it has two cleats, but that the boards do not go down to the bottom of them. The construction of this south piece is further seen in the end view, at the right hand of the larger view.

Fig. 5 is a view of the west side boxing piece. It has two cleats at the ends, *a a*. The one at the left hand is a little in from the end, as that end fits the dark place in the left end of Fig. 3. Two cleats, shaped as in the small figure of Fig. 4, are on the middle parts of the view. They serve the same purpose as in the large figure in Fig. 4. You need not be told that a corresponding east piece is to be made. Now arrange hooks, or other contrivances, and put this boxing together about your hives, arranged as shown in Fig. 2, and you have it ready to pack the bees. The best packing is dry saw-dust, or cut straw; cut it not over an inch long. Pack all about the hives, and at least six inches thick over the top of the hives. Now make a roofing; the form, as shown by Fig. 6, which is made of triangular boards, with boards nailed on the top of them. When done, the whole will appear as in Fig. 7, which shows the two hives, the south-end having three small entrances, too small for a mouse or rat to get in at, and an inch round hole just over the three entrances, which hole is covered with wire cloth; these are all the holes for ventilation necessary. The dotted lines show the form of an ordinary box hive, a foot square and a foot high. Of course, in making your platform and boxing, you will make them to fit the hive you use, which will alter lengths and breadths a little, but not the general shape of what we have described. The side view would be so similar to Fig. 7 that we do not give it. Observe this in putting your bees in winter quarters: If November 1st to 16th passes so cold that bees fly little, this is a good time to pack them in this boxing. If it is so warm that they fly a good deal till December 1st or 16th, then that time is the best. Let them have a few coolish days without protection, and be shut up a week or so before you change them from their summer stands to this win-

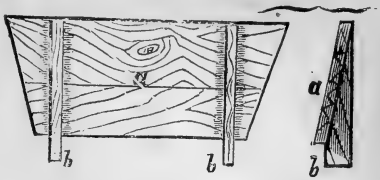


FIG. 4.—OUTSIDE OF END PIECE.

FIG. 5.—VIEW OF SIDE PIECE.


FIG. 6.—DESIGN OF ROOF.

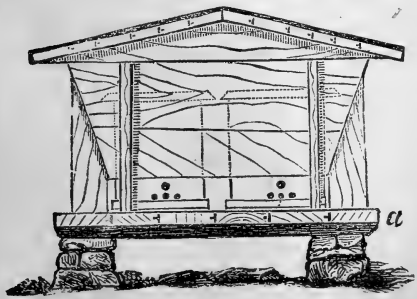
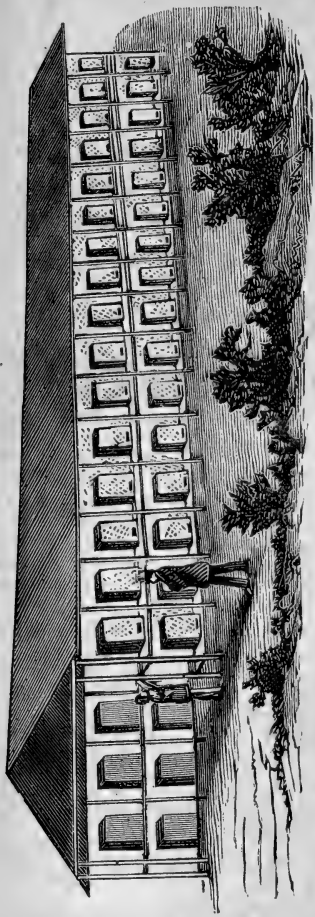


FIG. 7.—APPEARANCE WHEN COMPLETE.

ter packing. Leave the bottom boards of your hives on, and put a little sawdust under them. A bee-house is useful if it has a large window in the floor, for all operations that require to let the bees out in a room; then they fly to the window and get in bunches at its bottom near the floor, and when you are through with the changes to be made, they go easily into the hive. Make a tin reeling machine; reel out your honey; put it in neat glass packages; make holes on the side of your old-fashioned box hives, and get boxes everywhere—that is the secret of non-swarming; and make winter packing sheds as we have told you.

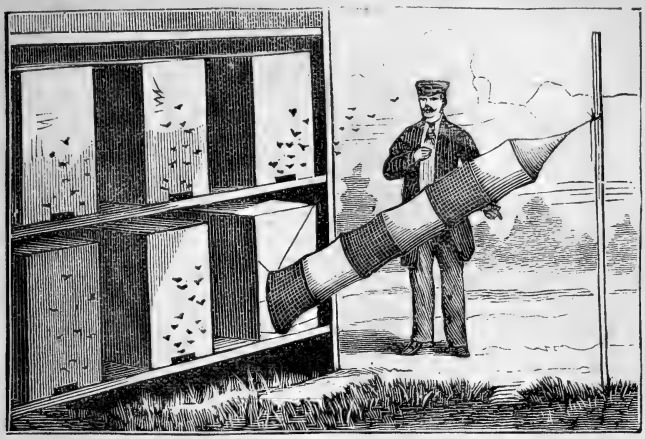


THE MAIN BEE HOUSE, SHOWING TIERS OF HIVES.

Bee Farming in Australia.—We present herewith a very interesting article on the subject of bee farming, as practiced in New South Wales, Australia, where, as will be seen, the industry is carried on on a very extensive scale. The article is carefully illustrated and the methods employed plainly described, and we trust that all who take an interest in the subject of bee keeping may gain some valuable hints and suggestions from a perusal of the same.

The operations in bee culture going on in Paramatta are well deserving of being ranked as bee farming. They are carried on after the most approved system of the German apiarians, which differs only in the form of hive used and a few minor details from the approved system followed in Britain and America. But to get at the history of the company whose operations we illustrate: It appears that, in December, 1881, a skilled bee master, Wilhelm Abram, arrived in Sydney from Germany, where bee culture is a recognized industry and subsidized by the State, and is under the care of scientific entomologists, for the purpose of teaching the art of bee culture to those desirous of making it their study, and at such an institution Mr. Abram was trained. Before leaving Germany he purchased some of the prize swarms at an exhibition of Italian bees in Germany, and the Italian Bee Company commenced

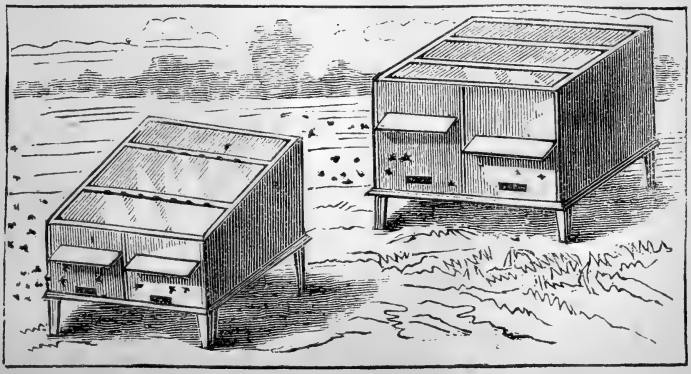
operations with these at Parramatta, in January, 1882. An importation of prize queens from America was made, and the operation of queen rearing



THE SWARMING BAG, A GREAT IMPROVEMENT.

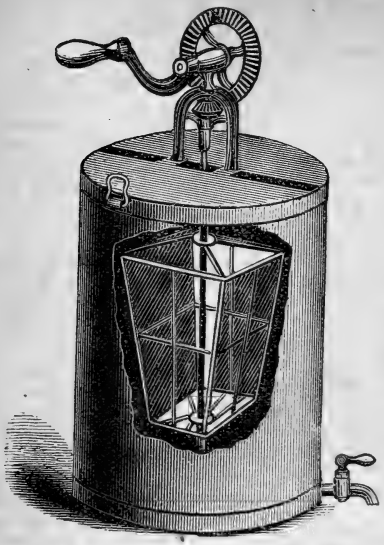
was entered on. In the meantime a number of colonies of the common black or English bee had been secured and transferred to frame hives, and as Italian queens were reared, the black queens were removed and replaced by Italians, the progeny of which replaced the black bees, as the latter died out. Not much attention was paid to producing honey until the race of Italian bees could be firmly established, and the result was that in the spring of last year there were about eighty colonies of gold-banded Italians actively at work.

The bee master is an adept at his profession. With a pipe in his mouth,



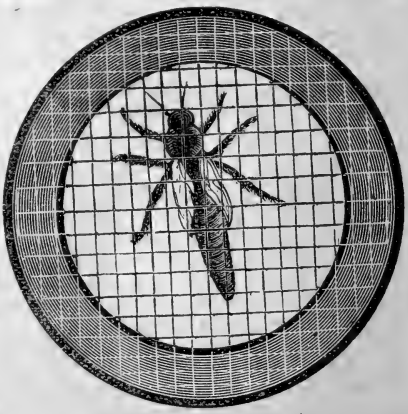
THE QUEEN BREEDING HIVES.

he opens hive after hive, blowing a whiff of smoke upon them, to give the bees something else to think about when they seem any way refractory, a projection from the stem of the pipe allowing this to be done conveniently. The hives used are of the German bar-frame kind. They open from the back, and each hive is two stories high, so that ample space can be given to the bees when they are storing honey rapidly. The main house is about 150 feet in length, 10 feet high, 10 feet wide, and two tiers of hives are arranged on each side, as shown in the sketch.



CENTRIFUGAL MACHINE, SHOWING INSIDE.

The swarming bag is one of the best things we have seen in bee culture. It is about six feet in length and one foot in diameter, and formed of alternate lengths of calico and mosquito netting, each length having a ring of cane inside to hold out the bag, as shown in the sketch. When the bees are about to swarm, the bag is fastened on to the front of the hive, and the other end fastened to a stake. When the queen emerges she bounds up into the upper end of the bag, and is quickly surrounded by her followers. Thus the swarm is captured with ease, the alternate breadths of mosquito netting and calico making the interior light and enticing for the bees to enter and cluster. They are then shaken into a bar-frame hive.



THE QUEEN CAGE.

The queen breeding hives are much smaller than the others, and are arranged at distances of about twenty feet apart alongside the fences. Two or three frames of brood comb are put into each hive, with a queen cell coming to maturity. When the queen bee hatches out of the cell she makes a flight (the only flight of her life) in order to meet a drone or male bee. She is then fertilized, and becomes the mother and queen of a family, laying eggs

at the rate of 2,000 daily when the season is good and stores abundant. The centrifugal machine is used for extracting honey without destroying the comb. The caps with which the bees seal up each cell of honey are sliced off with a very thin-bladed knife of simple form, and the frames are set in the metal basket of the inside of the machine. Then, by turning the handle, the honey is thrown out and runs down the sides of the machine, from which it is drawn by a tap, leaving the comb undamaged and ready to be returned to the hives for the bees to fill over and over again with nectar. In this way absolutely pure honey is got without any other substance whatever, and without injuring the bees or annoying them. The queen cage, as shown in illustration, is drawn to scale, as is the queen or mother bee seen inside.

The Culture of Buckwheat for Bees.—Prof. Cook gives the following on this subject:

Buckwheat is valuable as a honey plant, as it can be made to bloom when there would otherwise be a dearth of flowers. We have found in our experimental beds that the Silver Hull variety has more flowers in the panicles, and yields more to the acre. The honey is dark, but is preferred to all other kinds by some people. It blooms from four to six weeks after sowing.

It will do fairly well on any soil, but thrives best on a rich soil. It should be sown broadcast, three pecks to the acre. It is usually sown here late in July, but for bees it had better be sown early in June. Then it will bloom about the middle of July, when bloom is usually absent, and will, I think, yield just as well; though I judge simply from observing small plots. The cultivation before sowing should be deep and thorough.

When ripe it is cut and allowed to lie on the ground to dry. When dry it is bound and drawn to the barn, where it may be threshed at once, if it is desirable to do so. In fact, the cultivation, soil and harvesting of buckwheat are much the same as that given to oats.

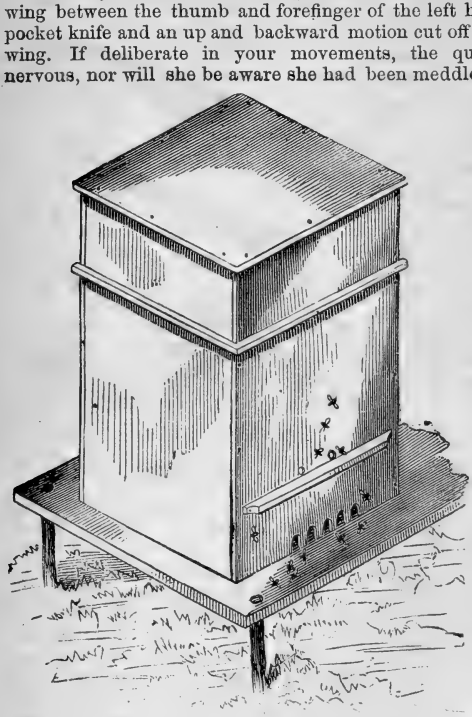
It is safe in estimating that each acre of buckwheat sown within one and one-half miles of an apiary is worth $100.

Buckwheat, like other plants, is capricious. Some seasons it yields but little honey. It is not a favorite of bees; at least I have known bees to leave it for other plants. Perhaps it contained no nectar at the time.

Will Bee Keeping Pay?—Of course it will. There is nothing that either men or women can engage in that will pay anywhere as well as bee culture; and there is nothing so well adapted for the farmers' sons and daughters as bee keeping, and if they would take hold of four or five colonies of Italian bees they never would want for a few dimes to go to a strawberry festival, or perhaps they might want to go to that world-renowned exposition that always visits every village about the July days, and if they have been good, industrious boys and girls, and will have looked after bees, they will have the satisfaction of having their own money, and will not have to ask father for the money when he is so pushed with his crops and so short of money to pay his hands. But to make the keeping of bees a success, you must go into it understandingly, and if you have not already the bees on hand, you will have to purchase a few colonies, and be sure to get Italians. If they are not in a movable comb they will have to be transferred. You will then have them in a hive that you have complete control over, even to examine every comb and seeing every bee or queen in the hive.

Clipping the Queen's Wing.—The clipping of the queen's wing having become a matter of acknowledged good policy, as we knew it would, the

question naturally arises, What is the best method for clipping it? We have tried all plans, and find the quickest, easiest and the least risk attending the following: Lift from the hive the comb on which you find the queen, slant it toward the hive with the lower end resting on the ground and the upper end against the hive, make no rapid motions to alarm the queen, but deliberately wait till she is in a position that you can grasp the end of one wing between the thumb and forefinger of the left hand, then with a sharp pocket knife and an up and backward motion cut off about one-third of the wing. If deliberate in your movements, the queen will not become nervous, nor will she be aware she had been meddled with, no scent of the fingers will be left on either her wings or body, and no commotion created in the hive.



BEE HIVE.—FIG. 1.

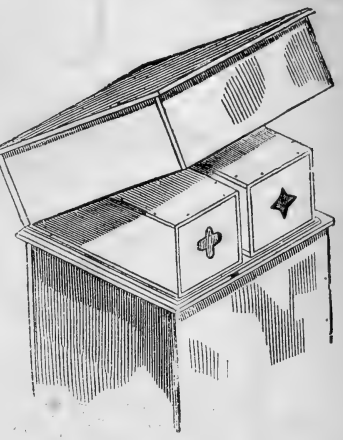
An Unpatented Bee Hive.—Apiarians know full well the importance of providing the honey bee with a properly constructed and well arranged hive, in which these little workers may safely store the nectar carefully gathered from the blossoming sweets of earth. Many good and valuable hives for this purpose have been constructed, and are the subject of letters patent, for the manufacture and use of which a royalty is required by the owners thereof.

The hive shown in connection with this article is, beyond question, the simplest, cheapest, and best arranged unpatented hive extant. Fig. 1 is a perspective view of the hive as it appears upon the sand. In appearance it has a neat, unpretending look of self-recommendation.

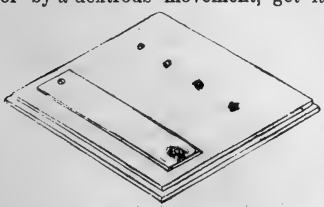
The advantages gained by having a passage for the bees at the bottom, and six inches upward therefrom, at one side of the hive, are: *First.* During winter snow and ice accumulate in sufficient quantities to entirely fill and cover the lower series of holes, while the upper ones remain open, admitting fresh air, the importance of which all apiarians are familiar with. *Second.* Bees alighting at the upper series of holes, upon returning from a long and fatiguing flight, have but a short distance to traverse to reach the place where the accumulated sweets are to be deposited.

The hive proper is 12x12x15—2,160 cubic inches, inside measurement. When filled with honey it weighs eighty pounds—a sufficient quantity to feed a large colony of bees during the season not fruitful of flowers.

For supporting the comb in the desired position, small round sticks are used in the same manner as in the old box hive. The cover to this portion has its upper surface beveled near the edges, to receive and retain in position a small or upper hive, seven inches high and twelve inches square, inside dimensions. It is shown in proper place in Fig. 1, and raised in Fig. 2, disclosing the surplus honey boxes, which are two in number, 11 1-2 x 6 x 5 1-2 inches, outside measurement, made from quarter-inch pine lumber, with glass ends or sides, either plain or ornamental, as the contents may be designed for home consumption or exhibition at the sale-room, or to compete for premiums at fairs. Each of said boxes connects with the lower hive by four one-inch holes, which are made in hive and boxes at the time of their construction. They afford a sufficient passage-way to and from said boxes. The top of the hive is delineated in Fig. 3. One series of holes is shown, while the other is covered (in use both should be) by securing a thin strip in the proper position by screws. They remain thus until the hive is thought to be filled, or a sufficient quantity accumulated to successfully winter the bees. At this juncture carefully remove the screws, slightly raise the strip, place one of the surplus boxes at the end of the strip, and gradually, or by a dextrous movement, get it in place, as shown in Fig. 2. When both are in position, place over them the cover, and, unless you are careless, not one bee is injured by the operation. Should the surplus boxes be provided with glass ends you may at any time during the season view the stores therein accumulated by raising the cover. At or soon after the appearance of autumnal frosts, remove the surplus boxes, cover the series of holes as above stated. At the approach of winter again remove them; thereby all vapor arising from the breathing of so great a number of insects passes into the empty space above, thus in a great measure, preventing death by the congealing of this vapor. Other points of merit could be noticed, but will suggest themselves.



BEE HIVE.—FIG. 2.



BEE HIVE.—FIG. 3.

Advice to Young Bee Keepers.—Beginners in bee keeping should not, when going into the business, build costly bee houses, provide high-

priced, untested, patented hives, purchase a large number of colonies, or buy "three-banded" Italian queens at a time when, as yet, they can hardly tell a drone from a worker. Begin moderately and hasten slowly. The needful experience in practical bee culture is much more easily and far more efficiently acquired by careful attention to a few choice stocks, than by a hurried supervision of a large number, even with the aid of manuals and text-books. Plain, simple, movable frame-hives, too, will be found better suited for the requisite manipulations than fanciful and complicated contrivances devised by persons really ignorant themselves of the habits and wants of bees. And colonies placed in an open situation, with their hives readily accessible from all sides, and somewhat sheltered or shaded by trees or vines, will be much more conveniently managed than when placed in ordinary sheds or out-door bee houses. Study first to know what is required for success, and then extend your operations when you are sure that you can have the business "well in hand."

How to Catch Swarms.—For the past ten or twelve years, says a correspondent of the *American Bee Journal*, I have not cut my fruit trees to catch swarms. I get an ordinary sized basket, and nail a three-eighth-inch board on the bottom, with some suitable springs under it; then bore a hole in the center, and put an iron down through, with a loop on the top and a nut on the inside, and screw it fast; buckle a strap, six or eight inches long with a snap on it, in the loop. Have a pole cut from the edge of a two-inch plank, dressed any length, from eight to ten feet, with a ferule on each end and one-quarter inch iron rod sixteen inches in length; take a small ring, and bend an eye on the end of the rod, with the ring in it; taper the other end, and make it secure in the end of the pole; then curve it so as to project it six or eight inches, in which snap the basket catcher.

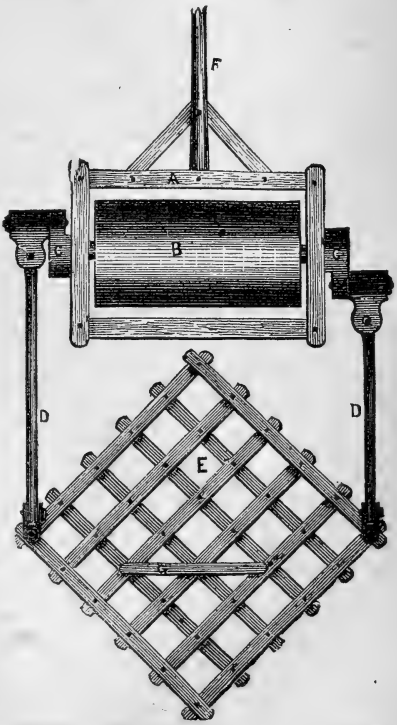
To use it, push it among the branches of the tree which the bees are making for, and if they do not light upon it, when they begin to cluster, put the catcher up against them, and when you get part of them on your basket, move it a little away and toward the branch that they are on, and they will all settle on the basket in five minutes.

To complete the pole, get a one-half inch rod of iron, twelve inches long, tapered at each end, and secure it in the lower end of the pole; and when the bees begin to settle on the basket, stick the spear in the ground and let it stand, while you are preparing the hive, etc. Then take down the pole and unhook the basket with bees, which may be carried any distance you wish. Shake off the bees on an open sheet in front of the hive, showing them the way, and they will go in faster than a flock of sheep into a yard after the gate is open.

Mice in the Apiary.—During the winter mice are sometimes troublesome guests in the apiary, especially if the hives are surrounded by straw in which they can harbor. The best preventive is to have hives so tight that they can gain no admittance. For the sake of ventilation it is not well, however, to have the entrance closed air-tight; therefore, fasten a piece of wire gauze over the entrance of the hives that may be in the cellar, or that may be buried in the ground; this will exclude mice and admit air; and over the entrance of hives that are covered with boxes, fasten a piece of tin about a quarter of an inch above the bottom board, so that the bees can just pass under the edge of it, while the mice are excluded.

FARM IMPLEMENTS.

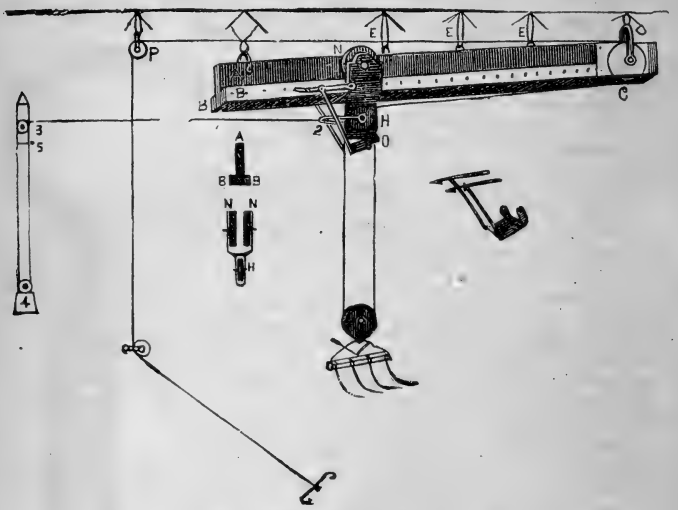
Combined Roller and Vibrating Harrow.—The thorough pulverization of the soil is, and will be, an important item in the tillage of the earth. The most effective method, therefore, of attaining this result, is one of interest to every individual. Our engraving on this page is intended to represent an arrangement of a combined roller and vibrating harrow, the successful working of which we have had the opportunity of witnessing. The invention consists of the frame, A, roller, B, which may be constructed of either iron or wood, the axle of which terminates at each end in a strong crank, C, C, of from six to nine inches in diameter. These cranks are keyed upon the axle in opposite positions. Connected to the wrist pins of each crank are the connecting rods, D, D, which extend backwards, and are attached to opposite corners of the harrow, E. The attachment of the connecting rods to the cranks is made with universal joints, so as to allow of a free and easy working of all the parts, and to permit the roller and harrow separately to accommodate themselves to the inequalities of the ground. The manner in which the harrow is vibrated through the medium of the crank in rotating with the roller, it is not necessary further to explain. If the machine is used as shown in the drawing, the last operation performed will be that of harrowing, but if it is desired to leave the ground in a rolled condition, all that is necessary to do is to turn over the tongue, F, of the roller, until it rests upon the cross pieces, G, and attach the team by a chain, to what will then be the front corner of the harrow. Or should it be desired to use



COMBINED ROLLER AND VIBRATING HARROW.

the roller or harrow separately, they may be readily disconnected by driving out two of the bolts in the universal joints. This invention is public property for the benefit of the world at large.

Hay Elevating Apparatus.—We present herewith a sketch and description of a new hay elevator, in the form of a suspended track and hay-fork traveler, which we think will not only prove a timely suggestion, but a positive boon to many farmers. This track can be suspended in any barn, high or low, without any additional timbers. The hay can be run up, and over beams, without any scattering or dragging. Another great advantage in this plan is having the rope double from the fork to the traveler. This gives the



HAY ELEVATING APPARATUS.

horse great power on the fork just where it is needed, that is, when the forkful of hay is separating from the load.

It consists in part of a track made of hard wood, in the form shown. The center piece A is six inches wide and one and a half inches thick, put together with dowel-pins, until as long as wanted. The slats B B are two inches wide and one inch thick. They are nailed on the lower edge of A, breaking joints as they are put on. They are put on each side of A as shown in sketch. There is a pulley C, six inches in diameter by one and a half inches thick, put in the back end of the track. The box for this pulley is made by bolting a short piece, six inches wide and one inch thick, on each side of A. A, clevis; D goes over the track and is fastened on with the bolt that goes through the pulley. C, a rope is put through the clevis and this end of the track is drawn up close to the rafters. The front end is suspended by a clevis and two ropes; it is hung a foot or so lower than the back end. Screw into A the hooks that come with the fork, about eight feet apart, and into each put a strong link six inches long by one and a half inches in the

opening, as shown at E, E, E; these are for the rope to pass through, and also to suspend it by.

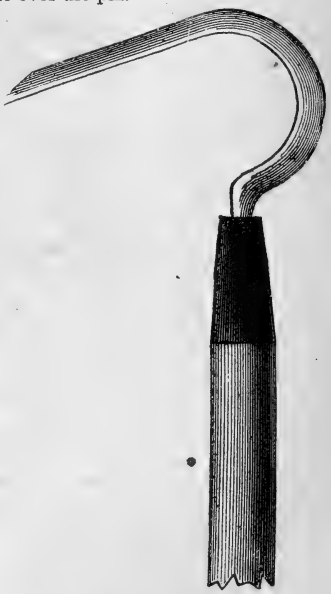
The traveler consists of a pulley and pulley box, H, with sides four inches apart, extending up some seven or eight inches, which carry two rollers, N N, four inches in diameter and one inch thick, which roll on each side of A, and directly on B B. There is an eye, O, on the traveler, in which one end of the haul rope is tied; it then passes around a pulley on the fork, then through the pulley in box H, around pulley C, through the links E E E, around pulley P, and around a pulley at the floor, then to horse.

There is a latch, as shown at the right of the drawing, to hold the traveler over the load until the fork is elevated; when the pulley on the fork strikes the bottom of the latch and raises the catches up, then the fork moves back; when the fork returns, the catches slide over the pin.

There is a small rope (1) fastened to the traveler by a clevis, 2; said rope passes over a pulley, 3, down to weight, 4, around the pulley fastened to the weight, up to the eye, 5, where it is tied.

By this arrangement a long track can be used in a low barn. The weight will bring the fork back without pulling on the trip cord.

In using this plan, the horse, after he has drawn up a forkful, is turned to the left; around to the side of the rope, and walked back to the starting place; he is then turned around to the right, on the same side of the rope that he came back on; by so doing, there is no stepping over the rope, which generally twists or untwists it, and renders it very liable to loop around a horse's legs as the fork comes back. The weight must be only just heavy enough to bring the fork back slowly, then the rope will not pull on the horse when he is coming back.

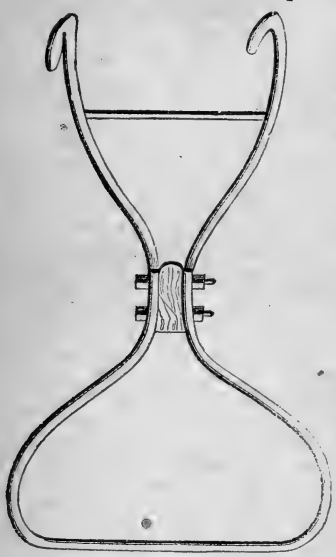


HOME-MADE TOOL.—FIG. 1.

Home-Made Tools.—Frequently the farm and garden tools and contrivances that are home-made are quite as effective as expensive boughten ones, and farmers that are blessed with a little ingenuity are continually "fixing" up some kind of a labor-saving machine to work with. Our illustrations represent two very handy and useful implements, of which a farmer writes as follows: "While using to-day a tool which just suits me for killing weeds, it struck me that it might just suit others, even if it is home-made and not patented. To make it, take an old twelve or fourteen-inch half round file; grind off the teeth, bend it as shown in Fig. 1, and put it in an ordinary handle. Now, if you want to loosen the soil, or pull out sods or large weeds, you have a light pick to do it. If you want to kill ordinary

weeds turn the hoe flat on the ground and scrape away. Now, as the file or hoe has two sharp edges, you can use either side; as it is long it will work very rapidly; as it is narrow it will work easily, and not draw the dirt over the weeds and re-plant them, but will tumble them on top for old Sol to deal with.

"Another home-made tool now in season, and which has saved me much labor between rows of mangel wurtzel, carrots, etc., is made by taking a piece of old, thin, sharp tire, reversing the bend so as to bring the flat side down, bending it to fit between the rows and with the two ends brought together so as to bolt to an old plow beam, as shown in Fig. 2. Make one, hitch old Tom before it, and go to work, and if it don't work to a T, tell."

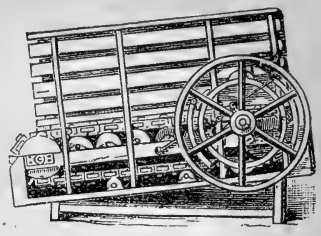


HOME-MADE TOOL.—FIG. 2.

Care of Farm Implements.—Any implement that with good usage and protection will last eight years, will become weak and defective and generally useless, if exposed during four years to dews, rain and sun. It cannot be otherwise. Dew is very destructive to all wood, and sun cracks admit rain and moisture to the interior fibres, to work injury there. To leave implements thus exposed is a direct loss of fifty per cent., a heavy tax. But to state it mildly: An implement which, left unprotected would last five years, will undoubtedly last six years if always kept dry and in the shade when not in actual use. This will save one-fifth of its efficiency, or twenty per cent. A few boards or a straw cover, and attention to having implements always put under, is far more profitable than to "work out" the twenty per cent. to buy new ones. Woodwork that must be left exposed, will be greatly benefitted by a frequent application of paint, or simply a coat of painting oil and by filling up all sun cracks, as soon as formed with such oil. The use of crude petroleum tends to the preservation of wood, and may be applied to all unpainted woodwork of implements.

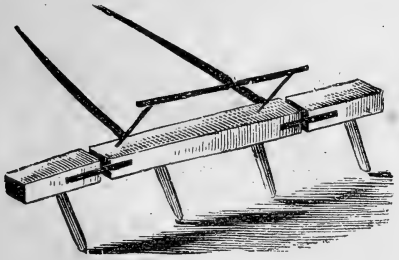
Improved Tread Power.—In the tread-mill power we have here illustrated, the endless traveler consists of cast-iron chain links joined together and carrying lags which are connected to the links by a tenon on each end fitting in a corresponding mortise in the link. Carrying rollers are fitted to run in boxes attached to the frame, so that the chain links run along on them from one to another, and in order that the rollers may be of larger than ordinary size and placed farther apart, the chain links have abutting shoulders above the pivot joints, which hold the lags up level for the horse to walk on. Each lag has a rib or cleat nailed on the upper surface just back of the front

edge. The rollers that sustain the weight of the horse may be larger, stronger, and easier running than where the rollers are attached to the chains. For a brake to regulate the speed of the machine, a couple of centrifugal levers are pivoted to a couple of the arms of the flywheel, and having a brakeshoe on the short arm to act on a friction rim attached to the frame, the long arms of the levers being connected to the rocker bar by rods, and to the rocker one of the levers is connected by a coiled spring and adjusting screw, which tend to keep the brakes off the rim when the speed is not too high; but when excess of speed throws out the centrifugal levers the shoes will be pressed on the rim till the speed slows to the proper limit. The machine is provided with a simple stop device and is improved in other details.



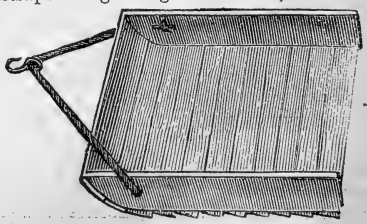
IMPROVED TREAD POWER.

A Good Corn-Marker.—The worst difficulty with ordinary three or four tooth corn-markers results from the inflexibility of the long bar to which the teeth or marker are attached. In passing over uneven ground some of the teeth will not touch the earth, and consequently the planter must guess the position in which the seed should be planted. The marker we herewith illustrate is constructed to surmount this difficulty—two joints being made in the bar which allow each tooth to make its proper furrow on a very uneven surface. The joints are made by sawing the bar apart at the places indicated in the engraving, then connecting the sections by bolting on two stout iron straps, the bolts passing entirely through the bar of wood. Four straps of light wagon tire iron, each six inches long, and four six inch bolts will make the two joints. A space of one inch left between the sections of the bar will give sufficient flexibility to it for the purpose required.



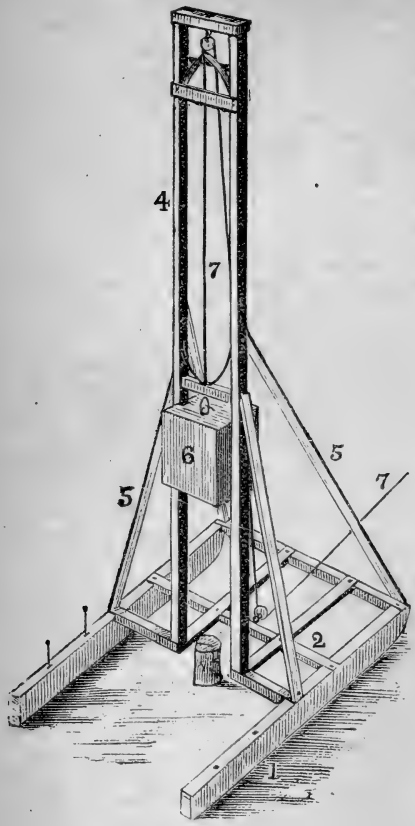
A GOOD CORN-MARKER.

A Good Clod Crusher.—Take two pieces of board 2x6 or 8, and round the end of each with an ax. Nail boards 6 feet long on the bottom. They should be about 1 1-2 or 2 inches thick, beveled and lapped, as shown in our engraving. Bore 2 holes (in place where indicated) with a half-inch bit; take 8 feet same sized rope, and tie loop in middle; put ends through holes and tie knot in



A GOOD CLOD CRUSHER.

each to keep it there. Hitch your team to it, jump on yourself, and drive ahead. Once going over will be sufficient. Your land will be finer than you could harrow it in a week. It is better than a roller, for it levels the land, does not pack it, and draws easier than either harrow or roller, and can be made by a boy ten years old in half an hour's time.



SPILE OR POST DRIVER.

Spile or Post Driver.—Every farmer has often seen the time, we believe, when he could have saved himself or his men a great deal of hard labor, if he could only have had the use of a spile or post driver to sink a few spiles here on this marshy land, to build a dam, or to drive down a few posts there to erect a small building upon or to drive down a line of fence posts; but, not being the possessor of one himself, and not knowing where he could borrow one conveniently from a neighbor, the work has been done without it, and much unnecessary labor wasted thereupon. We consider a post driver one of the most useful implements, for general use, to be found upon a farm. We present an illustration of a good and substantial post driver, with simple directions how it can be made, and would offer the suggestion that the dull months of the winter season will afford a good opportunity for those who wish to provide themselves with one of these useful implements, to do so, and thus have it in readiness for use when next season's work begins.

The machine we have illustrated is of quite simple construction, and with the exception of a little iron work, the pulleys and rope, may be made by any farmer who is handy with tools. The pair of runners (1) are 9 feet long, made of oak 7 inches wide and 4 inches thick. The cross pieces (2) are of 4 by 4-inch scantling. The distance from the rear cross piece to the next one is 10 inches, and from that to the front one is 2 1-2 feet. The rear one is left open in the middle, as represented, for the post. Two pieces of 2 by 4-inch

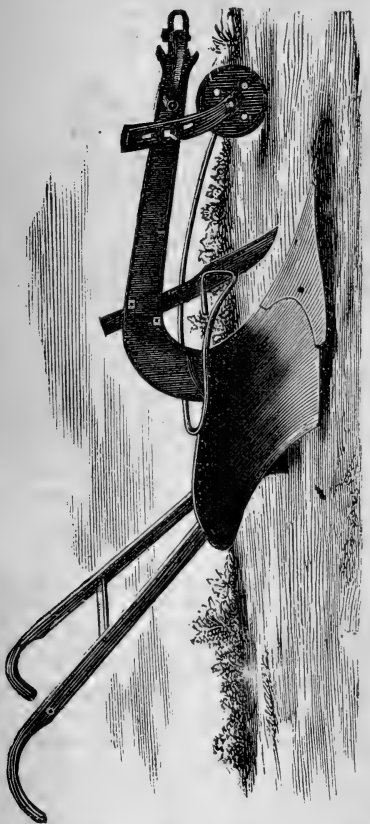
scantling are bolted across the top of the cross pieces near the middle, as seen in the cut. The two upright pieces (4) are 20 feet long, of 2 by 6-inch scantling stiffened by a 2 by 4-inch piece spiked on the outside edgewise. They would be better made of 4 by 6-inch stuff, or even 6-inch square, as they are required to be stiff. The braces (5) are 2 by 4 inches, the front ones a foot the longest. The weight, or block (6), may be round or square, 20 inches in diameter, and 2 or 2 1-2 feet long, of solid, heavy oak, and grooved on the sides next to the uprights. In the top of this is a strong staple, to which the shears, which are fastened in the sliding block above, catch. The grooves in the weight are 6 inches wide, to take in the whole width of the uprights (four pins on each side would answer the purpose of the grooves). Two 2-inch auger holes are bored through the rear portion of each runner, in order to drive in stakes or a crowbar to keep the machine from being drawn forward while driving the post. The working will be readily understood. A chain is fastened to the front cross-piece at the points where the top pieces are joined, to which the whiffletrees are hooked. It is then drawn forward by the team (a span of horses or mules) until the weight is over the mark for the post. The post being placed, the whiffletrees are then unhooked from the chain and hooked to the rope which pulls up the weight. One to three blows will drive the post in to the required depth. It is then drawn forward to the next post. Two men and a span of mules will drive three-fourths of a mile of posts in a day, and one man will mark for the posts and face them ready for the boards in the same time. The posts are slightly pointed, and thus driven, set very firm. The cost of such an implement is about $25, and it will pay for itself in a few days.

A Convenient Tool.—A cheap tool that will prove very handy and can be made very cheaply and quickly, and used for setting out plants such as sweet potatoes, cabbage, tomatoes, etc. Take a round piece of wood one and a half inches in diameter and about a foot long; sharpen one end neatly; at the other end cut down to one inch in diameter, one inch below the end; this will give a small shoulder all around.

Take another round piece of wood the same size, or if a little larger it will answer as well. Cut it four inches long, in the center bore a hole with an inch auger, and fasten this on the top of the other piece; this will serve as a handle, and the stick can be pushed down into the soil easily and pulled out, and can also be used to press the dirt firmly around the roots of the plants that you are setting out. Ten minutes' work will make one, and you will find it very convenient for use, so as not to have to hunt around for a sharp stick every time you want to set out a few plants.

Implement for Small-Crop Hoeing.—A Massachusetts farmer writes: "I beg to introduce a small hoe which has not been used among the agriculturists yet. It can be made of old discarded scythe-blades, cut sloping at the corners, so that the face next the ground is nine inches wide and the back six inches wide. At the corners, a quarter or half inch can be turned up at an angle to make a hook like a blacksmith's knife used to finish off horses' feet. Then a shank of three-eighths inch wrought iron can be welded on to the center, and the other end into a good handle. Any person skilled in hoeing trying this hoe to single out carrots, parsnips, etc., will wonder why he did not think of it before. I get an old table knife and heat it, turning about two inches of the end to a hook shape, to thin out my cabbage seed and onion beds, cutting the ground clean and quickly between the plants."

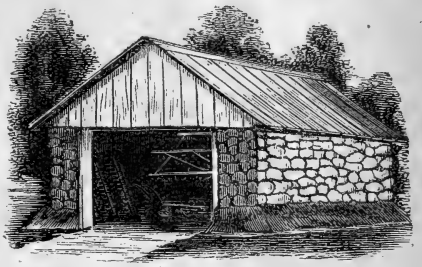
Coulter Cleaning Plow Attachment.—Our engraving represents a simple attachment to a plow, intended to keep the coulter free from obstructions when plowing in stubble or turning under long manure. It consists of a rod of iron, one end of which is attached to the wheel of the plow in such a manner that its turning will give the rod a backward and forward motion. The rod passes along under the beam and is bent around its base, or the shank of the plow in wooden beamed ones, just above the mold board, and forms a loop against the coulter. This loop, working backward and forward, works off all obstructions from the coulter.



COULTER CLEANING PLOUGH ATTACHMENT.

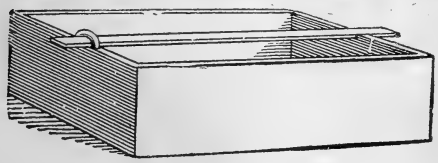
A Farm Tool House.—One of the most useful and money-saving buildings that a farmer can place on his premises is a spacious and convenient tool house. It is generally the case that there is room enough in the various outbuildings to house the farm implements if it is economized; but it is a corner here and a few feet of barn or shed floor there; sometimes in a cellar and sometimes in a loft, possibly easy of access, but probably difficult, and in all such instances it is space originally intended and needed for some other purpose. Tho main reason why so many farmers neglect protecting their implements from the weather when not in use, is the lack of convenient and roomy storage. We lay great stress on its being spacious and handy; for if it is thus, James will always drive the lumber wagon inside to take the hay rack off, and he will draw in the stone boat with the plow and harrow and cultivator on it, and they will escape the next rain or dew and the consequent coat of rust. A farmer needs a tool house as much as a horse-barn or a woodshed. Our illustration is suggestive. It is adapted to a locality abounding with stone. The walls of the building are made of that material, laid without mortar. The foundation is placed below the frost, and the earth is banked on the outside to further protect them and to throw off water. The top of the wall is leveled with

mortar, and a two-inch plank laid on, to which the rafters are spiked. The latter are braced on the inside by nailing on cross strips. The roof may be made of the cheapest material, which varies with localities. There is one window in the end opposite the door. The doorway should be twelve feet wide to admit a reaper, and if the location is not too much exposed there is little need of doors. The ground is the floor. The walls are but six feet high, and the structure should be twenty wide by thirty or forty long. Such a building will cost but little where stones are in the way. The farmer can build it, and will save many dollars in twenty years, and many steps each year otherwise taken after mislaid implements.



FARM TOOL HOUSE.

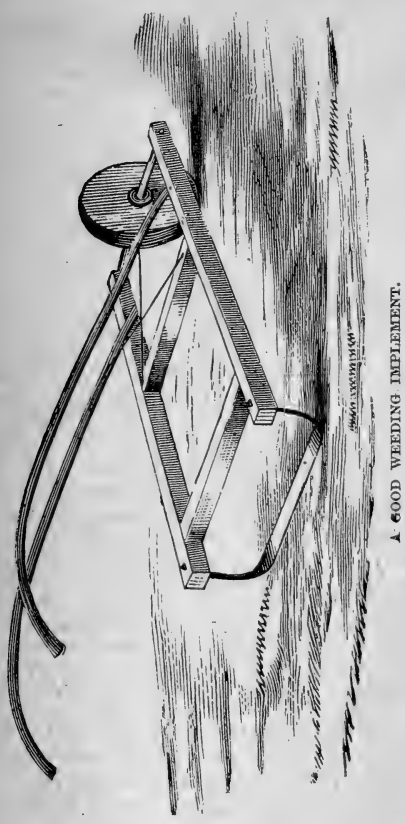
A Home-Made Corn-Sheller.—This is simply the use of a bar of iron laid across a box. The box is made of a convenient height to sit upon, say twelve or fourteen inches, and is eighteen by thirty inches square. This size will hold over two bushels. The bar of iron (or, better, of steel) should be 3-4 by 1-4 of an inch in size, and a little longer than the box. Put a staple sufficiently large to admit the bar into the middle of the upper edge of one end of the box, and cut a notch the size of the bar in the other end. Put in the bar, put a piece of board across the notched end for a seat and go ahead with your shelling. Both hands are used in the operation, the left clasped tightly around the bar between the legs of the operator, while the ear is drawn upward by the right hand, the fingers of the left holding it firmly against the bar, and slightly pushing it upward. Shell two thirds of the small end first, then turn and shell the butt. Two bushels of our small corn can be easily shelled in an hour, after getting a little accustomed to the manipulation. I have tried many other ways, but none have proved at once so easy and so rapid as this. We present a sketch of the box and bar.



CORN-SHELLER.

A Good Weeding Implement.—We give a sketch of an excellent weeding implement which is valued very highly by those who have used it. It saves at least the wages of three men. By actual experiment one man will do more weeding with it in the same time, and do it better, than four men with hoes. The implement costs about three dollars—not more, certainly—and will save fifty dollars worth of labor during one season. The frame is eighteen inches long and twelve inches wide. It is light, made of two or two and a half inch material. The wheel is ten inches in diameter, of inch and a half or two inch plank, with a tire of sheet iron. The knife in the rear is a bar of steel two inches wide and a quarter of an inch thick, bent

so as to lift the frame about five inches from the ground as it sits upon the surface. Each edge is sharp in order that it may cut both ways—the operator pushing it before him by means of the handles, cutting off the weeds, then drawing it back the same distance and lifting the knife at the same time, in order to insure a displacement of the weeds. The knife may be made of a width to suit any space between rows of vegetables. The form of the knife is such as that it may be run as close to the rows as is desired, without endangering the roots of plants—for it cannot cut under. Weeders of this character are sometimes made with the knife before the wheel. Anybody can make the woodwork of this weeder who has the tools. Ordinary plow handles that can be purchased for twenty-five cents will answer. The knife, the braces to the handles, and the tire of the wheel, is all the iron about it. We have devoted this much space to its description and commendation because there are many farmers who are turning their attention to root culture and to the culture of small fruits, and there are many others who would devote more acres to these crops were labor available. Those who grow carrots, onions, turnips, parsnips, the sugar beet, or even strawberries, will find, for money invested in one of these implements, a sure return. There is no patent on it that we know of, and any man with gumption can make one.



A GOOD WEEDING IMPLEMENT.

Thomas' No-Patent Scraper.—Our illustration represents a practical and very useful implement for use on public or private roads, and as there is no patent upon it, it can be easily made by any one as follows:

Take a hard wood plank, say three by fourteen inches, seven feet long. Bevel the back side, rivet on an old mill saw for the edge. Put in a mortise wide enough to receive the tenon of the pole on an angle—a common ash wagon pole with a tenon say two by four inches, and five feet of medium size cable chain fastened on each side of the pole two and a half feet from

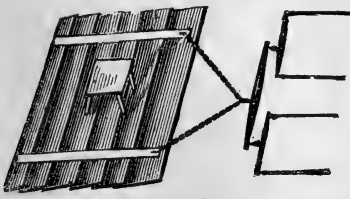
the tenon. Fasten to the plank, on a line below the mortise, one grub hook two and a half feet from the mortise, on each side of said mortise, to hitch to the chains on the pole. Unhook the chains, and your scraper is in two pieces, handy to pack away under cover. Estimated cost:

Pole, 25c.; plank, 25c.; old saw, $1.00; making woodwork, 50c.; chains and iron work, $1.50. Total, $3.50.

THOMAS' NO-PATENT SCRAPER.

Set your scraper at the right angle to carry the gravel or earth toward the center of the road, and drive on at a good brisk walk, the driver to ride or place on weights when necessary. If the road is very rutty or uneven, it is better to change the angle and drive back on same side, as the scraper would cross its own angle going back, and still carry the earth toward the center of the road.

A Clod Crusher.—We illustrate a very cheap, simple, but efficient implement—first made and used, we believe, in England—for breaking lumps of earth on plowed fields and leaving the surface smooth and finely pulverized. It is a very good substitute for the roller to smooth the surface of the field and cover grass seed sown after spring rains. It is made in this wise: Lay two oak scantlings, 3x3 inches square and three and one half feet long, parallel on the shop floor, three feet apart. Then spike a strip 2x2 and five feet long across two ends of the scantling; then four two-inch planks eight inches wide and five feet long, spiking them on like clap-boarding, and finish with a plank fourteen inches wide for the front. Turn your crusher over, affix a stool for the driver and the chains to the cross-pieces for the team to draw by, and the implement is completed.

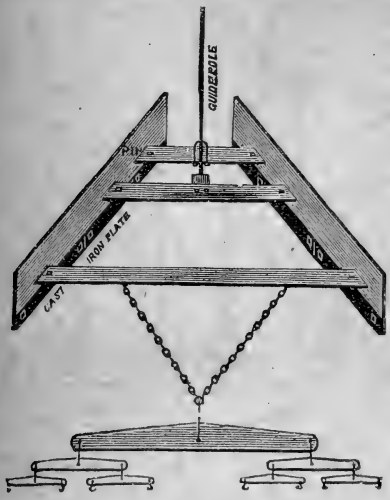


CLOD CRUSHER.

Improvement of Roads.—A Good Scraper.—We would like to call the attention of all lovers of good roads, and especially of those who are overseers, to the importance of some system in constructing and repairing public highways.

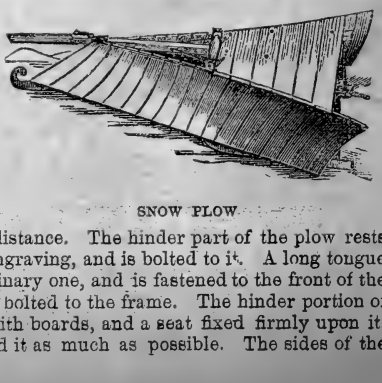
In the first place, all roads should be made and kept rounding. The ditches at the side should be deep, and of such a grade that the water may quickly run off. A road constructed in this manner may be kept rounding for a number of years by the frequent use of the large A scraper, drawn by four horses abreast. Perhaps this important road implement in some dis-

tricts is an unheard-of contrivance. Judging from the looks of many roads, we think it must be so, and for the benefit of overseers in such districts, we give a drawing on this page of the best large scraper we have ever seen. The scraper here represented is constructed of oak plank 11 feet long, 14 inches wide, and 2 1-2 inches thick, set up edgeways, in shape of the letter A, with the top cut off. The rear cross-piece is near the end, and also near the top edge of the plank. The next is distant from the other 1 1-2 feet, and 2 inches lower, for the purpose of allowing the guide-pole to pass over the rear one, and the end under the other, giving the other end the right length to take hold of. The front cross-piece is also near the end, and is the center of the plank. The rear end should be one foot throat; the front any desired width. To the inside of the plank, at the lower edge, are bolted plates of cast iron 5 inches wide and 1 1-2 inches thick, the holes through the same being slots longest up and down, that the iron may be lowered as it wears away. The cut of the scraper may be altered by moving the draw-clevis in the chain to one side of the center, causing one side to do the whole work, as is many times necessary. The great advantage of this scraper over others is that it continually draws the dirt toward the center, and leaves the road perfectly smooth and rounding.



A GOOD ROAD SCRAPER.

A Snow Plow.—The snow plow here illustrated is built so as to be fixed upon the forward part of a double sled. The frame is made of 4x4 oak scantling, and is similar in form to a double mold-board plow. One runner is fixed to the forward part, at such a distance below the edge of the plow as to raise it to clear obstacles such as stones or frozen mud which may be in its way. Four inches would probably in general be a safe distance. The hinder part of the plow rests upon the sled as shown in the engraving, and is bolted to it. A long tongue is fixed into the place of the ordinary one, and is fastened to the front of the plow by an iron strap, which is bolted to the frame. The hinder portion of the plow may be covered over with boards, and a seat fixed firmly upon it. When it is used, it is best to load it as much as possible. The sides of the


SNOW PLOW.

plow are made of half-inch oak or basswood strips, steamed and bent into shape. The outer surface of these strips should be dressed smoothly, which will make the draft easier.

Bag Holders.—Farmers who raise crops of cereals for market are well aware of the trouble and labor involved in the one operation of bag filling. It oftentimes happens that one person is required to hold open and fill the bag at the same time; this, however, is a slow and tedious process, and to expedite this important operation, at the same time render it less laborious, the bag holders shown in our illustration were invented. A proper size of the one delineated in Fig. 1 is platform K, 24x14x2 inches, either pine or oak; standard B, 4x3x36 inches; hopper P, 16x16 inches at the top, beveled to admit of the hooking thereon of the bag D, as shown. It is obvious that, by having the upper portion of the hopper of larger dimensions than the top or mouth of the bag, the operation of filling can be performed much quicker, and with less liability to spill the grain; the bag holder also dispenses with one hand.

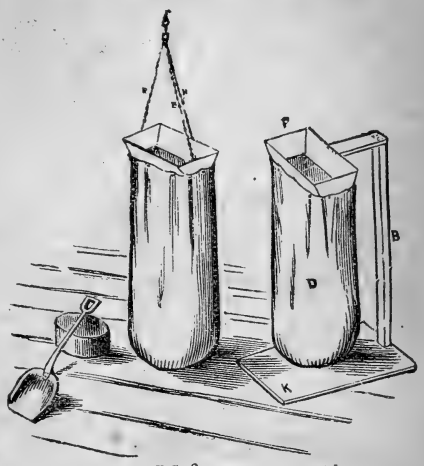
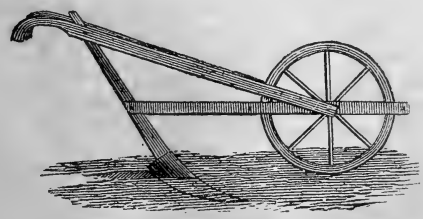


FIG. 2. FIG 1.

BAG HOLDERS.

Fig. 2 illustrates a simple arrangement for the purpose. The hopper is of the size of that in Fig. 1. It is supported by three short straps or chains, R R R, attached to as many of its several sides, which in turn are attached at the point M. This bag holder is cheap, simple, portable, and durable. It can be attached to the granary wall, or any portion of the barn above the floor. By providing the main chain M with a hook, it can be raised or lowered to accommodate bags of various lengths.



HAND PLOW.

Hand Plow.—Most vegetables are greatly benefitted by having the ground stirred frequently around them. Hoeing is a tedious operation both for time and patience.

We give a drawing of a small shovel plow with a wheel set in the tram, which can be pushed like a wheelbarrow. When loosening the soil is the object, it is a very expeditious machine. The tram is made by screwing to-

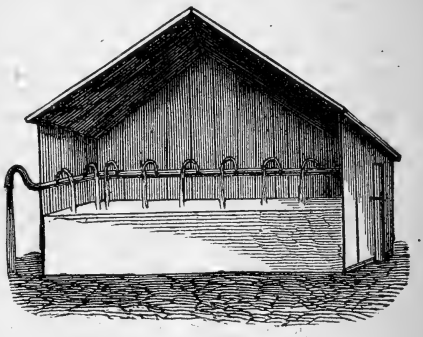
gether pieces of hard wood boards. The wheel should have a "broad tread" to prevent cutting in. A large cultivator tooth does tolerably well for a shovel. It works well for boy-power, by tying a drag rope to the end of the tram. With this a garden can be gone over in less than a fourth of the time required to hoe it, the same time may be given on different days with so much greater result, as the plowing is nearly as good as hoeing each time.

Keep the Farm Tools Sharp.—Too often these things are not thought of until the articles are wanted, when much valuable time is lost in putting in order what might as well have been done during the dull winter days. It has been computed that the same man can do as much in two days with a sharp scythe as in three days with one comparatively dull, and the same expenditure in force. And it is just the same in regard to all other tools or implements, whether operated by hand, steam, or horse power. The engineer continually oils the machinery, and a good saw or file is oil to hand implements. We know one who has a great deal of hand hoeing to do by hired labor, and he believes the continued use of the file on the hoes makes a difference of nearly one-half in the labor. His calculation is that every ten-cent file he buys saves him ten dollars in his laborers' bills. Look after the spades, scythes, hoes, chisels, saws, etc. A good grindstone and a set of files are among the best of farm investments. The best of all forehandedness is that which prepares in advance a full set of good and well-repaired tools to work with.

AROUND THE FARM.

Making and Keeping Ice.—The method of making and keeping ice we here illustrate and describe will be of practical use only to those who are fortunate enough to have a spring or stream of running water upon their place; but the same result might be obtained by pumping in the water, though it would involve much more labor and trouble.

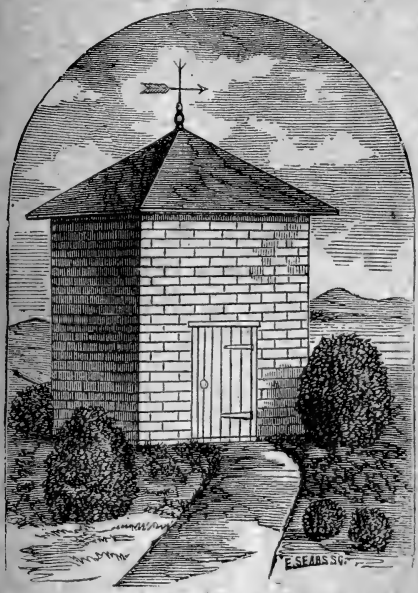
The icehouse should be built firmly of rough boards, as shown in our illustration. Put high up on the outside of the house a penstock, with which connect, by means of a hollow plug, a tin pipe about two inches in diameter, on the inside, making a hole through the siding for the purpose. This tin pipe may pass through the center of the icehouse, or it may be fastened to the side walls, passing partly or entirely around. If passing through the center, conical tubes similar to the muzzle of an oil can, about an inch in altitude, should be soldered on either side of the tin pipe so as to discharge jets at an angle of about 30 degrees to a perpendicular. If passing around the sides, cones should be so soldered on that the jets shall be thrown inward. The aperture through the apex of these cones should be very fine, about the size of a small pin. At the discharge end of this pipe, passing through or around the icehouse, should be fastened a rubber pipe of from four to six feet in length. By raising the movable end of this rubber pipe we give whatever head we desire to the jets; in severe cold weather the greater head, and as the weather moderates less. Should it be thawing or too mild to freeze, then lower the rubber pipe so that the water will flow through the pipe without being discharged from the cones. For this purpose the pipe should have a gradual descent toward the discharge end. Should this not effectually prevent any water flowing on the ice, then bore a hole in the penstock below the pipe passing through the icehouse, and let the water discharge from this hole during mild weather. The jets may be within two feet of each other. Better results attend a large number of fine jets than a less number discharging the same amount of water. In starting, the bottom of the icehouse should be covered with sawdust. The ice will form very slowly at first, but after the bottom is covered it will congeal more rapidly. After a sufficient quantity of ice has been formed, the sawdust may be put on, covering thickly around



MAKING AND KEEPING ICE.

the edges, so that as the ice melts the dust will fall down and protect it. Ice formed in this way will keep better than if sawed and packed in the usual way. We consider this mode of saving ice worth a practical test by all who have running water and sufficient fall.

Whitewash for Buildings and Fences.—If people knew how easily whitewash is made, and how valuable it is when properly applied, it would be in more general requisition. It not only prevents the decay of wood, but conduces greatly to the healthfulness of all buildings, whether of wood or stone. Out-buildings and fences when not painted, should be supplied once or twice a year with a good coat of whitewash, which should be prepared in the following way: Take a clean, water-tight barrel, or other suitable cask, and put into it a half-bushel of lime. Slake it by pouring water over it boiling hot, and in sufficient quantity to cover it five inches deep, and stir it briskly till thoroughly slaked. When the slaking has been thoroughly effected, dissolve it in water and add two pounds of sulphate of zinc and one of common salt; these will cause the wash to harden and prevent its cracking, which gives an unseemly appearance to the work. If desirable, a beautiful cream color may be communicated to the above wash by adding three pounds of yellow ochre; or a good pearl of lead color by the addition of lamp, vine, or ivory black. For fawn color, add four pounds of umber, Turkish or American—the latter is the cheaper—one pound of Indian red, one pound of common lamp-black. For common stone color, add four pounds of raw umber and two pounds of lamp-black.

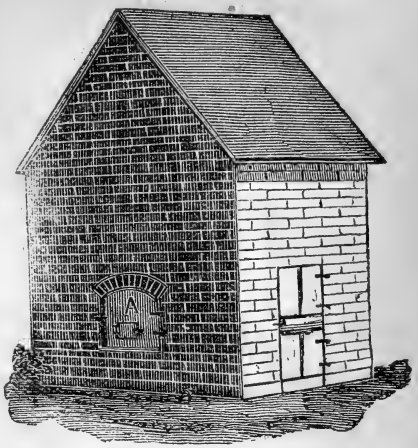


SMOKE HOUSE.—FIG. 1.

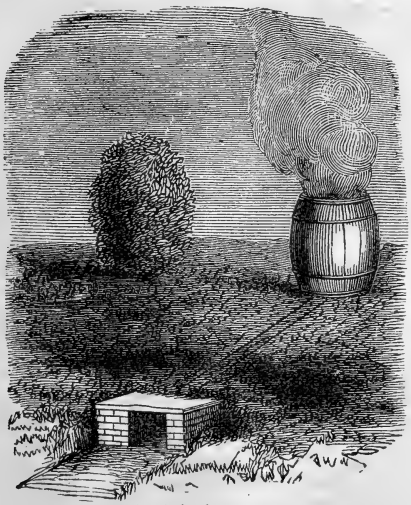
Smoke Houses.—Our first illustration, Fig. 1, represents a smoke house built of brick, 6x7 feet square, and suitable for a large farm. The bottom is excavated the size of the building, two feet deep, filled in with small stones, and on this a brick floor, well cemented, is laid. This insures dryness. The walls are of brick, eight inches thick and seven feet high, with a small door on one side, lined on the inside with sheet-iron or zinc. Hooks should be firmly attached to the joists, on which to hang the hams and shoulders. This style of smoke house is not very expensive, is safe from fire, and when

not in use for smoking meat, is an excellent receptacle for ashes, which ought never to be kept in contact with wood, on account of the danger from spontaneous combustion.

Our next illustration, Fig. 2, represents one of the best arranged smoke houses that we have ever seen. It was large and built of brick, with an iron door which is generally kept locked. In the gable end there is a fireplace with a door. "A" shows the fireplace with door, for making the smoke, a chimney leading up on the inside of the wall letting the smoke into the room. The advantage of this arrangement is that the fire for smoking is built without entering the building, and simply by opening the door of the fireplace. The smoke passing up the chimney on the interior side of the wall is cooled, and thus the meat does not come in contact with heat from fire. In the ordinary smoke-house, as is well known, the pieces of meat often break loose from their fastenings and fall into the fire or ashes underneath, and are injured or destroyed. In this plan the ash room may be partitioned off and the meat kept in a room by itself, and the door being always kept locked, except at such times as the meat is desired for the table, there is no chance of loss from thieves or flies. One can keep meat in this house in perfect condition from one end of the year to the other, and no losses can accrue from any source.



SMOKE HOUSE.—FIG. 2.



SMOKE HOUSE.—FIG. 3.

For those who want a cheap, easily made smoke house, our illustration, Fig. 3, will meet the requirement. It is made in a slight rise of ground, by an archway of brick, at the lower end of which the

fire is made, while at the upper end is placed a barrel or box containing the hams and other meat to be cured. The lower end is closed after the fire is well started, to prevent a too rapid burning of the corn cobs or other material used in smoking the meat, and also to direct the smoke to the upper orifice for escape.

Ensilage.—This word, which is only a few years old, grows out of the discovery made by a Frenchman, Auguste Goffart, that green crops, when stored in water-tight pits called silos, under a heavy pressure, do not rot, but are preserved fresh and sweet, and retain all their nutritive juices for a year or more; and that, when offered to cattle in this condition, in the winter, are preferred to any dry food. It is not surprising that the discovery made a sensation among farmers and cattle feeders in this country, and that there is exhibited a keen desire to know all about it; for, not only can a great deal more in weight, of green food than dry, be raised on an acre, but ensilage possesses the advantage of supplying cattle with succulent summer feed in the winter—an advantage of great value to milch cattle. Any green crop that stock are fond of when in a growing state is good material for ensilage—grass, clover, rye, young corn, sorghum and vegetables; but corn, clover and the grasses are most generally used, because when growing they are full of juice, which is lost in curing into hay or fodder, but preserved in the silo. Several kinds of green crops may be packed in the same silo, and the ensilage is said to be improved by the variety. Corn, either drilled or cultivated or sown broadcast, and cut in its most juicy condition, is the basis of most ensilage experiments in this country; it may be packed in the same silo with clover or grass of any kind cut green, and successive crops of corn may be planted for mixture with different kinds of grasses in their season. As it is estimated that ten to twenty tons weight of green crops may be cut from an acre of good soil—five to ten times as much as the weight of a dry crop of grain or hay—it is easy to see how much more profitable it is to save green crops in the form of ensilage than to allow them to mature and dry. Col. J. W. Wolcott, of Boston, who owns a farm near that city, raised 460 tons of ensilage on thirty-four acres—being fourteen tons to the acre—one year. By raising two crops on the same soil he has gathered as much as twenty-one tons per acre. On one piece of ground he gathered thirty-one tons per acre, but "that corn was fourteen feet high," he says. He adds: "I am satisfied that an acre of ground will keep a cow twenty-four months."

When the silo is opened in winter the contents are found in a sort of cheesy condition, and require to be sliced off with a sharp axe. They have undergone a slow and slight fermentation which does not impair their merits as feed and is not offensive to cattle. Indeed, the first smell of ensilage is said to "set cattle wild for it," and they prefer it to any other kind of feed.

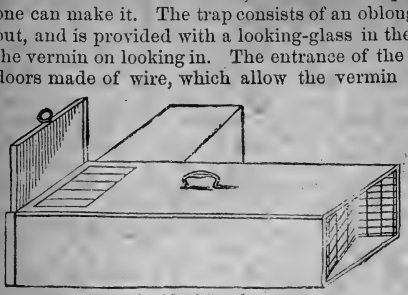
Silos are variously constructed. The usual plan is to dig pits ten feet wide, fifteen feet deep, and as long as may be desired, on sloping ground, and make them water-tight with cement. Mr. C. W. Mills, of Pompton, New Jersey, prefers to build a strong frame, boarded up tight and close with thick lumber, entirely above the ground, something in the fashion of an ice house. The green crops may be packed into them, either whole or cut up with a cutter; each plan has its advocates, though the weight of opinion is in favor of cutting, as it allows of closer packing. As the crops are thrown in they are tread down as closely near the edges as possible, and when the silo is full it is covered and weighted with heavy rocks or earth, and then shedded over to protect it from the weather. In a few weeks the ensilage is

"ripe" and ready for use. One end of the silo, if built along the ground, may be opened and the ensilage cut out and fed as it is wanted. Its quality will depend on the crops of which it is made and the care with which they are packed away. Nearly all animals will eat it; cattle like it and thrive on it, and for milch cows it is particularly valuable, as it increases their flow of milk and keeps them in cheerful, healthy condition.

What Goes with a Farm.—When a farm is bought or sold, questions often arise as to what goes with it, and disputes may often be avoided if farmers know just what their farm deeds include. In brief, says Mr. Haigh, of the Detroit bar, in the *American Agriculturist*, where no reservations are made in the deed, the conveyance includes the land, the buildings upon it, and all such chattels or articles as have become so attached or fixed to the soil or to the buildings, as to become what is known in law as "fixtures." What constitutes a fixture depends largely on the intention of the owner in putting it there, and also upon the manner in which it is affixed. Anything so affixed to the roll or the buildings that it cannot be removed without injury nearly always goes with the farm, and anything of a permanent nature, fitted for permanent use, and annexed thereto by the owner with that intention, generally goes with the land, though it might be severed without any injury, as the following examples will illustrate: All fences on the farm go without, but not fencing materials, as rails, etc.; if bought elsewhere and piled upon the farm, and not yet built into a fence, they have never yet been "annexed." But rails built from timber standing on the farm and piled up for future use go with it; their original annexation is not severed by being changed from standing trees to rails. If, however, they were cut with the intention of using them elsewhere than on the farm, they would then be personal property and would not pass. The bare intention in the mind of the owner in this instance makes the difference between real estate and personal property. Hop poles, if they have once been used upon the farm, are regarded as a part of it, though at the time of sale they are stored away for future use. Loose scaffold poles, however, laid across the beams of a barn, have been held not to be a part of the realty. Standing trees, of course, are a part of the farm; so are trees cut or blown down, if left where they fall, but not if corded up for sale; the wood has then become personal property.

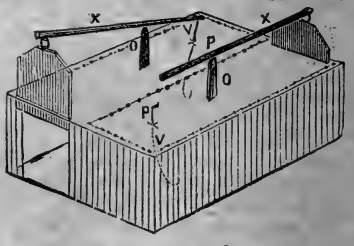
To Tan Hides.—We think that many farmers would tan sheep and other skins, with the hair and wool on, if they were told how. They are very convenient for sleighs, wagons, house rugs, and many other purposes. We give the following from a reliable source, remarking that it is essentially the same that we found in use by the trappers and hunters in the wilderness: All fatty and fleshy matter should first be removed from the skin, and with sheep skins the wool should be washed clean with soft soap and water, and the suds be thoroughly rinsed out. For each skin take four ounces of salt, four ounces of alum, and half an ounce of borax; dissolve these in one quart of hot water, and when cool enough for the hand to bear, stir in sufficient rye meal to make a thick paste. This paste is to be spread thoroughly over every part of the flesh side of the skin, which is then to be folded together lengthwise, and left for two weeks in an airy place. Then remove the paste, wash and dry the skin. When nearly dry, it must be worked and pulled, and scraped with a blunt knife made for the purpose, shaped like a chopping knife, or with a piece of hard wood worked to a sharp edge. The more the skin is worked and scraped as it dries, the more pliable it will be. Other furs can be tanned with the fur on.

Weasel, Rat, and Vermin Traps.—The common steel rat-trap is frequently used with good success in destroying these vermin, but we give herewith an engraving of a trap in this connection (Fig. 1), which we think will be found more effectual, and it is so simple in its construction that any one can make it. The trap consists of an oblong box, the end of which draws out, and is provided with a looking-glass in the internal side, which attracts the vermin on looking in. The entrance of the trap is formed of two spring doors made of wire, which allow the vermin to enter with least pressure. These doors have sharp points where they meet, which, although not felt by the vermin when entering, will prevent it from withdrawing after having once introduced its head. Near to the looking glass a bait is suspended, and a cage is also fixed with a chicken to serve as a decoy. These traps are self-setting, simple, inexpensive, fit for all sizes of vermin, and safe for the house, farm-yard, or game preserve.



TRAP—FIG. 1.

We also give an illustration of another trap (Fig. 2), which can be easily made by any person conversant with the use of a saw, hammer and nails. The top and bottom of the trap are made of oak board one inch thick and twenty inches square. It is divided into two parts, making really two distinct traps. The corners are of wire about one-quarter of an inch in diameter, and the sides and partitions of No. 7 wire. Holes are bored both top and bottom, and the wires inserted. The corner wires are riveted, holding the trap firmly together; the doors are of oak, three quarters of an inch thick, and are kept in place by a cross wire on the top board of the trap, and by two small staples near the bottom edge of the door, which slide on the upright wires on each side. The treadle X is also oak, working on the upright pin O, as a fulcrum, and being held in place by the wire hook V working on a pivot at P, and on the lower end of which the bait is placed. One side of the trap is represented as set, the other as sprung.



TRAP—FIG. 2.

Trapping the Mink, Skunk, Etc.—Next to the weasel, the mink is most dreaded among poultry. In localities near salt marshes, swamps, ponds, and sluggish streams they most abound. The ravages of the mink are easily told from those of the weasel or any other animal. He almost always carries off a portion of his prey and tries to secrete it. If you find a half-grown chicken or old fowl dead and dragged wholly or partly into a stone wall or under some building, you may be certain it is the work of a mink; and if you go to work *right*, you will be just as certain to trap him.

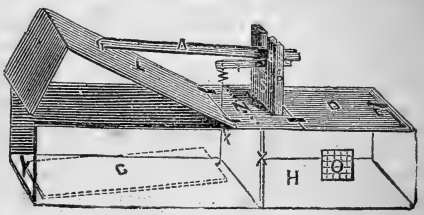
One peculiarity of the animal makes his capture easy—he *always* returns to a spot where he has hidden his quarry, or where he has made a raid; and

if he misses it, will go searching around for it. A knowledge of this fact led to the invention some years since of the trap we now illustrate. It is unpatented and our readers our free to make and use it.

The trap should be three feet long, one foot wide, and one foot high, outside measurement, and may be made of ordinary faced pine boards.

N is the only *solid* part of the *top*, to which is hinged the lids L and D, and also in which the standard S is mortised. The lid L is held up by the rod A, in which are one or more notches to elevate it the desired height, catching or hooking over the pin B, and projecting a few inches beyond. Under A, and hinged into the standard by the pin P, is the lever T, also projecting an inch or more beyond. C is a treadle board, hinged at Y to the bottom of the trap, and connecting by the wire W to the lever T, elevating it about two inches when set. H is the *bait* box, separated from the main trap by a wire screen, X X. O is a window, of which there should be one on each side about three or four inches square, also covered with wire or wire cloth, and D is the lid of the bait box, fastened down by the pin E.

If you have a chicken or fowl that has been killed by the mink a night or two preceding put *that* into the bait box and close the lid, placing the trap as near the spot where the dead fowl was found as you can. If a live fowl is put in, no harm can be done to it, the screen effectually protecting it. The mink enters the trap, and as soon as his weight gets well up on the treadle it pulls down the lever T, the projecting end of which dislodges the rod A, and drops the lid L. It is best to have a *weight* upon L, or else a catch to hold it down when sprung, as we have known an old mink to pry up the lid and get out. We have never known this trap to *miss* when set immediately succeeding the depredations of one of those *varmints*.



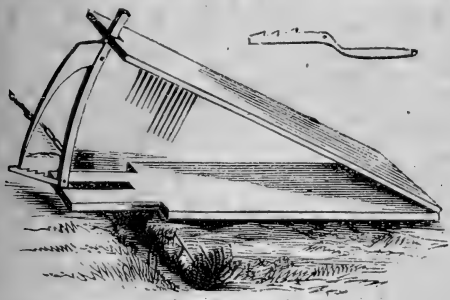
A MINK TRAP.

Next to the mink, the skunk is the most destructive to poultry. The best way to trap him is with eggs, of which they are passionately fond. They are not particular about the *quality*, as they seem to favor a rotten one, or one with a dead chicken in it. Tie the egg in a piece of netting, and fasten it to the treadle of a steel trap, or to a common box trap. Find their burrow, and set your trap near the mouth. It is nearly useless to set a trap where a theft has been committed. The animal may not go back there for months. He might possibly be caught in a night or two. But the chances are against it.

Crows and hawks are to be classed among the enemies of poultry. The former prey only on young chickens and eggs. Catch one and hang it in your poultry yard; no other crow will come near it. The quickest and surest trap for crows is to place a steel trap in the shallow water of a pond, so that the jaws when open, are just under water. On the treadle place a small tuft of grass or moss, making a miniature island. Then cut a small stick with three branches, forking in such a manner as to support an egg on them; stick this about six or eight inches from the trap; lay a little moss, grass, or leaves over it, and place the egg on the forks, so it will appear as if floating on the water; cover the remainder of the trap lightly with grass, so as to hide it from sight, for Mr. Crow is very observant. To obtain the egg the

crow will light on the "island," and find too late he is caught. When hawks are troublesome the only remedy is to shoot them. You will soon notice that he visits your yard about a certain time every day, and by watching for him you can soon rid yourself of the troublesome visitor—of course provided you are a good shot.

Trapping Ground Moles.—We give an illustration upon this page of a very good and simple trap that may be successfully used in catching that troublesome little pest, the ground mole. It is made of two ash boards, a full inch in thickness, seven inches in width, and two feet six inches long, attached to one end by a broad butt hinge. The form given to the bottom board is shown in the cut, the central slit being made to admit the free play of the trigger, which is represented by itself in the right-hand corner of the sketch. It is of iron, ten inches long; the lower part shaped like a paddle, five inches long, one and one-eighth inches wide, and the left-hand end, notched as shown, and three-quarters of an inch wide perpendicularly. The post, sixteen inches high, is curved to the circular sweep of the top board on its hinge. The teeth, six in number, on each side, are riveted seven-eighths of an inch apart, in a plate five and one-fourth inches long and one inch wide, containing four screw holes, placed zigzag, and this is found much firmer and more secure than if the teeth were inserted directly in the upper plank. The trap is set, as shown in the cut, across a mole track, first digging a hole eight inches square and six inches deep, and returning the soil, taking care to exclude all stones and large pebbles. Press the earth down pretty firmly, and set the trap so that the trigger touches the surface of the ground exactly over the line of the track. When the mole goes along his accustomed road, and finds it obstructed, his movements in reopening the track inevitably heaves up the surface, so as to set off the trigger, and the teeth on one side or the other will catch him. Weight the trap with a heavy flat stone.



A GOOD MOLE TRAP.

Ridding the Land of Stumps.—We have frequently noticed persons when clearing land make a brush pile over a green stump, with the expectation, apparently, that they were pursuing the right course to effectually rid the land of its presence immediately, while in fact no better means could be resorted to in order to insure its indefinite preservation. It has been the experience of the writer that a stump should never be fired until it has become sufficiently "seasoned" to insure its entire consumption, else the charred remnant becomes impervious to the action of the elements, and it will remain a troublesome customer to deal with for long years after.

These thoughts are suggested from a quite recent experience in dealing with some very "old settlers," which the hands on the farm wished to fire

several years back, and were only prevented from doing so by a positive command to the contrary. By a little patient waiting we are gratified with seeing "the places which once knew them, know them no more forever." This is one plan of treatment.

Martin Boxes.—The box-house does very well if made of any small box about fifteen inches square (which can be had of any grocer), with a division put in it so that two families can inhabit it. A square hole should be sawed out at the bottom edge opposite each division, and the bottom nailed on. Place the box on a pole from twelve to fifteen feet high, or on the gable end of a roof, or even in a tree, and your house is finished. It can be painted or not, or even made in fancy designs, which are quite attractive to the eye. The illustration given on this page will convey the idea. A hop, or other rapid-growing climber, if planted at the bottom of the pole, will climb up it and cause it too look quite ornamental and picturesque. We have seen them built two stories high, made like a diminutive gothic cottage, which is quite pretty. The house should be made before the martins come, as they are generally in a hurry to locate and go to "housekeeping." By all means give them some kind of a home.

MARTIN BOX.

Cisterns.—Many who have cisterns and depend upon them for their supply of water for family use, hardly realize the importance of keeping them sweet and clean. Rain water as it comes down from the clouds is probably as pure as any water can be, but after it has washed over a roof and down the conductors into the cistern, carrying with it dust, leaves, and other rubbish that may have gathered on the roof or in the gutters, it is not strange that the cistern should need to be cleaned out every year or two. If the cistern is not much used the water is quite likely to become bad. It may look all right, and not taste very bad either, and yet not be healthful. Of course all cistern water should be filtered, and a soft brick filter is perhaps the best; but even then it will become necessary to clean the cistern as often as every two years, and better every year.

To Purify Cisterns.—Throw in two ounces powdered alum and two ounces borax to a twenty barrel cistern of rain water that is blackened or oily, and in a few hours the sediment will settle, and the water will be clarified and fit for washing

Silos and Ensilage.—The new system of preserving and feeding ensilage, says an intelligent writer, is one of such simplicity that doubting minds are incredulous as to possible results. If the building of a silo and the subsequent process of filling with ensilage were some wonderful secret, or perhaps a new discovery protected by a series of patents—if the use of the system were permitted only under the payment of heavy royalties—there is a class of skeptical minds who fatten on uncertain qualities, and who have but little faith in any practice which is within the reach of persons of ordinary intelligence and common sense. It is difficult for many minds to realize the facts claimed for ensilage or to explain to themselves why such results should be secured by processes so simple and by apportions so economical. Yet proof, absolute demonstration, is within the reach of every inquiring mind, or of every enterprising farmer who is willing to spend fifty dollars for commencing experiments upon his own farm.

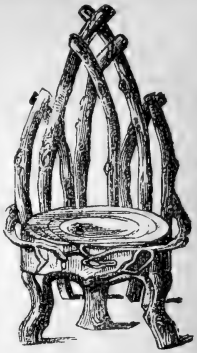
It is a most singular fact that the doubting minds are those who have had no practical experience on the subject, but whose conservatism is on the parade. It is equally surprising that no intelligent, practical attempt at silo building or ensilage feeding has resulted in failure, although men of all classes and attainments have experimented with the new system. It would be reasonable to expect many failures among so many beginners of varying capacities, were there anything intricate or uncertain in the process and its auxiliaries. No authority in this country is competent to pronounce positively upon the future success or failure of this new system; it is for the interest of no one to urge or induce the adoption of the system by any unwilling farmer, and no one is to be enriched by the multiplication of silos, except, perhaps, the individual owners. Many a conservative farmer will await the report of his more enterprising neighbor, who has built a silo, yet it is certain that before many years every one will have an opportunity to judge the merits and drawbacks of the system of ensilage.

New Way with a Silo.—A Massachusetts farmer records his experience as follows: We had always raised more or less Indian corn, using the stalks for wintering our limited number of cattle. After increasing our herd we planted fodder corn to help out our stock of corn stalks. However, the hard labor attending the cutting, binding, shocking, and curing the fodder made us willing investigators of the new and highly recommended system of ensilage feeding. From all who had constructed silos and tested ensilage we heard uniformly favorable reports. We could not learn of a failure, hence we determined to test ensilage for ourselves, only hesitating on account of the probable labor and expense attending the erection and weighting of a stone silo.

Learning that wooden silos found favor with some farmers who pronounced them equally as good, so long as they lasted, as the more costly stone affairs, we determined upon constructing our silo of wood. Our barn is a two-story building, measuring 40x80 feet. It contains several large bays, the dimensions of which are 20x24 feet. We sealed up one of these bays with 1 1-4 inch matched spruce boards covered with tarred paper. We cemented the bottom of the silo, also the walls under the sills of the barn. We coated the inside of the silo with coal oil to prevent the effects of moisture upon the boards.

We stored about 125 tons of corn fodder in the silo, treading it down by men, instead of horses, by reason of the small size of the silo. We were about three weeks storing the whole of our fodder on account of the lack of

help. For covering the silo we used hemlock boards and tarred paper, no other weighting being applied until some three or four weeks later, when we stored a quantity of dry corn stalks upon the top of the silo. Upon opening the silo we found the fodder in a perfect state of preservation, the ensilage showing no mold, except a little on top, just under the cover. In preparing the fodder, we employed a two-horse power to run our cutter, the latter being provided with a carrier for delivering the fodder in the silo.



RUSTIC SEAT.—FIG. 1.

Rustic Seats for the Lawn.—The garden and lawn are incompletely furnished if they are not supplied with some kind of seats whereon one may recline at ease. Fortunately these seats need not be costly; it would, indeed, show bad taste to have them so. Something easy, graceful, fantastic, rustic—something that the sunshine or the wind will not harm, or have its beauty destroyed by the rain. The materials for such seats are nearly always at hand—at least on every farmer's premises. All that is required is a little skill and patience to construct them. The branches of the trees may be bent and shaped into tasteful chairs, and any desired form given to them. The branches of the red cedar tree and wild grape vine furnish the best of material for this style of rustic seat. Our illustration, Fig. 1, shows a very pretty chair made in this manner. A few pine boards cut out and nailed together, as represented in the engraving, Fig. 2, will form a cheap and convenient rustic seat, which will be admired for its very simplicity and quaintness.

RUSTIC SEAT.—FIG. 2.

A favorite shade tree on the lawn may be surrounded with seats so attached that one in sitting may lean against the trunk Our illustration, Fig. 3, will give a good idea of how seats of this kind may be constructed.

Of materials there are plenty around almost every homestead—tasteful labor only is wanting to make appropriate rustic seats. The position of such seats is worthy of consideration. As they are mainly intended for use in warm weather, they should be amply shaded. A

RUSTIC SEAT.—FIG. 3.

position should be chosen that commands a good prospect—if not a distant landscape, then of the beauties of the lawn and the flower garden. Some, at least, should be screened from observation by shrubbery—fragrant if possible—where one may read or work. It is during the warmer months that the garden and lawn offer their greatest attractions, and everything that tends to make them more enjoyable should be provided.

How to Preserve Cider.—A pure, sweet cider is only obtainable from clean, sound fruit, and the fruit should, therefore, be carefully examined and wiped before grinding.

In the press use hair cloth or gunny in place of straw. As the cider runs from the press let it pass through a hair sieve into a large open vessel, that will hold as much juice as can be expressed in one day. In one day, or sometimes less, the pomace will rise to the top, and in a short time grow very thick. When little white bubbles break through it draw off the liquid through a very small spigot placed about three inches from the bottom, so that the lees may be left behind. The cider must be drawn off into very clean, sweet casks, preferably fresh liquor casks, and closely watched. The moment the white bubbles before mentioned are perceived rising at the bunghole, rack it again. It is usually necessary to repeat this three times. Then fill up the cask with cider in every respect like that originally contained in it, add a tumbler of warm sweet oil and bung up tight. For very fine cider it is customary to add at this stage of this process about half a pound of glucose (starch sugar), or a smaller portion of white sugar. The cask should then be allowed to remain in a cool place until the cider has acquired the desired flavor.

In the meantime, clean barrels for its reception should be prepared, as follows: Some clean strips of rags are dipped in melted sulphur, lighted and burned in the bunghole and the bung laid loosely on the end of the rag so as to retain the sulphur vapor within the barrel. Then tie up half a pound of mustard seed in a coarse muslin bag and put it in the barrel, fill the barrel with cider, and add about a quarter of a pound of isinglass or fine gelatine dissolved in hot water. This is the old fashioned way, and will keep cider in the same condition as when it went into the barrel, if kept in a cool place, for a year.

Professional cider makers are now using calcium sulphite (sulphite of lime) instead of mustard and sulphur vapor. It is much more convenient and effectual. To use it, it is simply requisite to add one-eighth to one-quarter of an ounce of the sulphite to each gallon of cider in the cask, first mixing the powder in about a quart of the cider, and giving the latter a thorough shaking or rolling. After standing bunged several days to allow the sulphite to exert its full action it may be bottled off. The sulphite of lime (which should not be mistaken for the sulphate of lime) is a commercial article, costing about forty cents a pound by the barrel. It will preserve the sweetness of the cider perfectly; but unless care is taken not to add too much of it, it will impart a slight sulphurous taste to the cider. The bottles and corks used should be perfectly clean, and the corks wired down.

A little cinnamon, wintergreen or sassafras, etc., is often added to sweet cider in the bottle, together with a dram or so of bi-carbonate of soda at the moment of driving the stopper. This helps to neutralize free acids, and renders the liquid effervescent when unstopped; but if used to excess, it may prejudicially affect the taste.

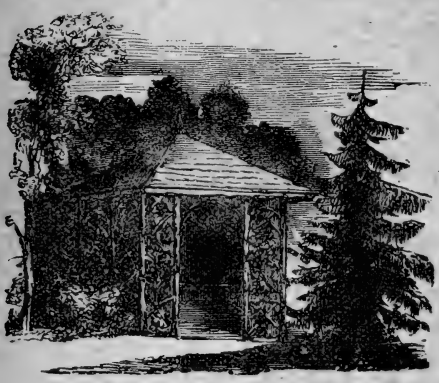
What Birds Accomplish.—The swallow, swift, and hawk are the guardians of the atmosphere. They check the increase of insects that otherwise would overload it. Woodpeckers, creepers, and chickadees are the guardians of the trunks of trees. Warblers and flycatchers protect the foliage. Blackbirds, crows, thrushes, and larks protect the surface of the soil. Snipe and woodcock protect the soil under the surface. Each tribe has its respective duties to perform in the economy of nature, and it is an undoubted fact that if the birds were all swept off the face of the earth man could not live upon it, vegetation would wither and die; insects would become so numerous that no living being could withstand their attacks. The wholesale destruction occasioned by grasshoppers which have devastated the West is to a great extent, perhaps, caused by the thinning out of the birds, such as grouse, prairie hens, etc., which feed upon them. The great and inestimable service done to the farmer, gardener, and florist by the birds is only becoming known by sad experience. Spare the birds and save the fruit; the little corn and fruit taken by them is more than compensated by the quantities of noxious insects they destroy. The long-persecuted crow has been found by actual experience to do more good by the vast quantities of grubs and insects he devours than the harm he does in the grains of corn he pulls up. He is, after all, rather a friend than an enemy to the farmer.

Recipe for Curing Meat.—To one gallon of water take one and one-half pounds of salt, one-half pound sugar, one-half ounce saltpetre, one-half ounce potash. In this ratio the pickle can be increased to any quantity desired. Let these be boiled together until all the dirt from the sugar rises to the top and is skimmed off. Then throw it into a tub to cool, and when cold pour it over your beef or pork. The meat must be well covered with pickle, and should not be put down for at least two days after killing, during which time it should be slightly sprinkled with powdered saltpetre, which removes all the surface blood, etc., leaving the meat fresh and clean. Some omit boiling the pickle, and find it to answer well, though the operation of boiling purified the pickle by throwing off the dirt always to be found in salt and sugar. If this recipe is strictly followed, it will require only a single trial to prove its superiority over the common way, or most ways of putting down meat, and will not soon be abandoned for any other. The meat is unsurpassed for sweetness, delicacy, and freshness of color.

Value of Drainage.—As a matter of fact there is very little land in our country that would not be improved by drainage. Many light soils are springy, and the crops are injured in them by stagnant water. Heavy land can never do its best until drained. Vast areas of low-lying but rich land are practically valueless for want of drains to carry off the redundant moisture which forbids the growth of any but aquatic plants. Many who admit the importance of this improvement are puzzled about the ways and means of effecting it. The *Drainage Journal* mentions the following plan, which is well worthy of serious consideration: "Some enterprising tile manufacturers select careful farmers who own flat lands, and make them something like the following proposition: That the farmer make a careful estimate of his average crops, and the tile manufacturer proposes to furnish the tile necessary to drain thoroughly the lands designated in the agreement, the farmer to furnish the labor of putting in the drains at a stipulated price, to be paid out of the excess of crops grown on the land over and above the average yield before agreed upon, and the tile manufacturer agreeing to take the

balance of the increase in four or five crops (as agreed) to cover the cost of the tile. On level lands, where the average crop runs low and the land by nature is rich, it is a safe proposition for the tile manufacturer, if the farmer honestly performs his part of the contract. On rich level lands that need drainage, and need it badly, it will pay twenty-five per cent. annually on the investment, and in some instances more."

Rustic Garden House.—No accessories to the garden add more to its beauty and comfort than pleasant, comfortable seats and resting places. They may be composed of a few sticks, forming a simple seat under the shade of some tree, or may be made in the form of rustic houses. Simplicity, however, must not be lost sight of, and no foolish attempt should be made to eclipse the simple beauty of nature by any expensive display of art. In our travels on the Hudson we once stopped at the beautiful garden of A. J. Downing, and after admiring the fine specimen trees it contained, and surveying the finely-kept lawn, we found ourselves reclining in a pretty rustic house, a view of which is given in the engraving on this page, and we now present it as a model for this kind of work. A little patience and taste and a very few tools will enable one with ordinary mechanical skill to erect such a house at leisure times, almost without cost.

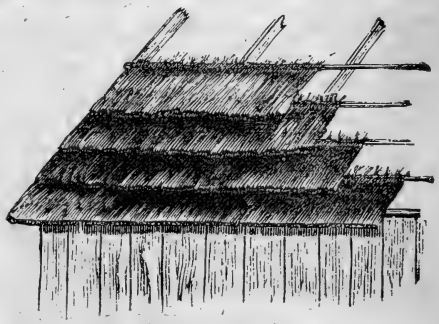


RUSTIC GARDEN HOUSE.

How to Make Sorgo Vinegar.—A correspondent writing from Loutre Island, Mo., in the *Rural World*, tells how he made 1,000 gallons of No. 1 vinegar mostly from sorgo skimmings. He says: "Of course the first skimmings are not used. I had two 160-gallon tubs. Into these I put about 70 gallons of apple pomace (cider and all), 25 to 30 gallons of skimmings, according to thickness, then filled up with rain water. I let it remain for two or three days, then drew it off and put in a large 1,000-gallon cask, which I finished filling by the latter part of October. Next spring I drew it off in 40-gallon barrels, put them in a warm place where the sun shone on them part of the day, and I soon had the very best of vinegar. The above casks were in an out-house where it was as cold as out of doors. Of course it had no time to sour that fall, as winter set in early in November; consequently freezing did not hurt it, though it should not freeze after once becoming sour. Pressed or dry pomace is just as good, only add skimmings and water for the cider taken. Vinegar made this way is better, I think, than when made of sorgo alone. It can hardly be detected from pure cider vinegar, and is just as good. Bear in mind that only enough water should be added to reduce the strength of the skimmings to about that of cider. You need saccharine to make good vinegar. You can't make vinegar from a few apple peelings and a barrel of rain water."

Blasting Stumps.—The following is the *modus operandi* of blasting stumps with dynamite: Make a hole an inch in diameter near the stump, inclining at an angle of about forty-five degrees, so as to reach underneath the body of the stump. This hole may be made with a crowbar through the soil, but if there be a large deep tap-root it will be necessary to continue the hole into the body of the tap-root by means of a long auger. A cartridge containing three or four ounces of dynamite is then inserted to the bottom of the hole, and a slow match having a peculiar percussion cap on the end is inserted in the cartridge. The hole is then tampered with earth, and when all is ready the outer end of the match is lighted, and the operator retires to a safe distance. The explosion usually not only extracts the stump from the ground, but tears it into pieces small enough to handle easily. The dynamite costs about forty cents per pound, so that a three or four ounce charge, with its fuse, would cost about ten cents—making the cost of blowing up a stump about ten cents, besides the labor.

How to Thatch Roofs.—Rye straw threshed with a flail and kept straight, with the short or broken straws raked out, is the best material. The roof is made ready for thatching by nailing strips of boards, say one by two inches, across the rafters, putting them a foot apart. The pitch should be steep, to insure a waterproof and durable roof. The straw should be cut to a uniform length, and care taken to have it straight and all right. The sketch shows how the roof is prepared for the straw, and the manner the courses are laid. Tie the straw in bundles that will average six inches in thickness. The band should be close to the upper end, the one which is fastened to the cross strip. The courses should overlap, so as to make the roof the thickness of three bundles.



HOW TO THATCH ROOFS.

Fish Culture for the Farm.—No farm should be without a fish pond, well stocked, any more than it should be without poultry. This may be a startling announcement to farmers who have to go one hundred feet to water, but it is none the less practical, as much as to keep stock on such a farm. Water must be produced in either instance. On most farms the drainage is favorable to ponds by throwing a dam across some sag or ravine and retaining the water that would naturally run off. The pond would serve the purpose of both stock and fish. Where this plan is not practicable, a pump worked by a wind-mill will answer as well if kept running; the surplus water drained into an artificial pond would supply the water. The pond should be at least eight feet deep in the center. This would give the fish an opportunity to place themselves beyond the reach of ice. A pond of fifty feet in diameter would accommodate a reasonable supply of fish for an

ordinary family if the fish are properly fed. Perhaps there is no fish so well calculated for this character of farming as the carp. It feeds on vegetables, and in its habits has about the relation to an ordinary game fish that the farm yard fowl has to the game fowl.

A Suggestion for Drainage.—A Missouri farmer relates an experience which offers suggestions, which, while they may not be exactly new, may have for many, great practical value. There were upon his farm several depressions which in wet seasons held ponds of water. To drain these by ordinary means would have been very expensive, because no gravel could be got near the farm, and there was no tile factory in that vicinity. Open ditches were out of the question.

The services of an expert well-borer were secured. He sank several test shafts in various parts of the farm, and found that the underlying ground was a tenacious blue clay, fourteen to sixteen feet thick, and almost perfectly impervious. Beneath this was found a strata of white sand. The well-borer and his machine were placed in a wagon, which by means of a long rope was hauled to the deepest parts of a pond about an acre in extent. Here he bored a well down to the sand, completing the operation before sunset of the day when the work began. In thirty-six hours the water had disappeared and the pond was dry. To make this short perpendicular drain permanent he had it cleared of sediment, sunk the shaft about two feet into the bed of sand, and filled to the top with clean, coarse gravel from a creek bed. The gravel was heaped about a foot high above the shaft to strain the water properly that the shaft might not become choked.

They are thousands of places in the West where, year after year, farmers have plowed around such wet spots, giving them up to the possession of rushes and frogs. Yet they could be drained easily by a few hours' work. In Western Michigan a large swamp lay for years on the southern edge of a village, a noisome barrier to progress and a bone of contention in village and township politics. To drain it a large ditch a mile or two long would have been required; but some one, fortunately, discovered that a thin sheet of clay was all that kept the water from going down into a deep strata of gravel, boulders and sand. The wells were sunk and the swamp thoroughly drained at an almost nominal cost, leaving rich black soil, which is the most productive and valuable in all that district. There may be thousands of similar swamps, where two or three days spent in sinking test shafts would show a ready means for converting sloughs or swamps into fields of wonderful fertility.

Important Use of Coal Oil.—A Southern farmer says: "I once read an article enumerating some of the practical uses to which coal oil can be successfully put, in which the writer suggested that it would be an effective remedy against the apparently indestructible bott or grub in horses. I had a horse which had always been sohopelessly infected with both grubs and the small intestinal worm, that he could never be kept in a better condition than that of a skeleton, and with a ravenous appetite, and the best of treatment with the use of all known remedies, appeared to be nothing more or less than an improved type of a successful worm manufactory. Out of patience and disgusted with my patient, and not knowing how much kerosene a horse could take without injury, yet determined to "kill or cure"—not caring much which—I commenced to drench with a gill of oil, intending to double the dose every day till a "cure" or a "kill" was effected. On the

first day I gave a gill, on the next a half a pint, and on the third a pint, and it was very soon apparent that that was enough both for the worms and the horse. Large quantities of both kinds passed, and the horse appeared to be on the point of passing too, but he didn't; and soon after all the usual symptoms of worms had disappeared, and the horse commenced to improve rapidly in flesh and general condition, and is now in better condition than I have ever seen him, and still improving.

"I also experimented with kerosene on cut nails to make them take the place of wrought nails in a cart body I was building. I brought the nails to a red heat, dropped them into the oil and let them stand until cool, when they could be clinched, bent and twisted into any desirable shape almost with as much ease and safety as a piece of wire, of the same size. My cart body required 100 nails, for which any blacksmith would have charged me one dollar. Two pounds of ten penny nails cost ten cents, leaving a balance of ninety cents in favor of the kerosene. This is a small item, but the farmer can save many such during the year, and it is the little things that pay."

Draining Wet Land.—The objects of draining are:

1. To carry off surface water, by open drains.

2. To lower the water line.

3. To prevent waste of the surface-applied manure, by washing off the soluble elements before they become incorporated in the soil.

4. To put the soil in a condition to be benefitted by the use of lime, ashes and alkaline substances. There is no use in manuring or liming land that lies under water half the year.

5. To make the land a better absorbent of ammoniacal, nitrogenous and carbonic acid gases—so necessary for the growth of all crops.

6. To make the soil more porous, so that rains and melted snow shall descend through the soil, leaving their fertilizing elements in the earth that has acted as a filter, instead of flooding the surface and carrying all their rich freights off of the land.

The infinitely wise Father has provided a vast reservoir of the richest agricultural elements which He pours upon the earth, in the rain and snow, for us to utilize. The science of agriculture is teaching the wise how to secure and utilize these elements. One way to do it is, to render the soil porous and friable, ready to receive and hold the nitrogen and carbonic acid gas that is precipitated upon it in showers and snow. The nitrogen thus precipitated by rains goes down to the alkaline elements constantly being liberated in the soil and unites with the potash, soda and lime, forming the nitrates of lime and soda and potash, thus making the soil one vast laboratory, on nature's grand scale, for the production of a fertilizer that will never deplete but constantly enrich the lands of the intelligent agriculturist.

7. To enable the farmer to start his plow from ten days to three weeks earlier in the spring, and to keep it going when lands undrained are unfit to work. The time lost on undrained lands in the spring and fall and after heavy rains, which can be improved on well drained lands, will be sufficient in from one to three years to satisfactorily drain most farms.

8. To make the land earlier and later. Well drained land is much warmer and advances the growth of plants faster than land saturated with water. As we can start our plows from ten days to three weeks earlier on drained fields than on undrained, there is more than a corresponding difference in maturing of the crops in consequence of a warmer and quicker soil. And as the plow can run later in the season when the fall rains are made to

percolate through the soil into drains, so the season is not only earlier in the spring but correspondingly prolonged in the fall, enabling one team to accomplish during the season much more work. Every farmer knows what a rush and hurry there is, when ground is undrained, to push things when soil is tempered just right for work. Well drained land is always tempered right. Steady work, which accomplishes the most, and not hurry, becomes the order of the day, while there is always time to do everything well.

9. Another object of draining is to deepen the soil. Where the water line has been six inches from the surface, that is the depth of the man's farm for all practical purposes. Neither cereals nor root crops will go down below the water line. Trees do badly. Apples, pears and quinces blight when the top roots go below the water line. Lowering the water line twelve inches gives the tiller of the soil a new farm more valuable than the first. The potash, soda, phosphoric acid and lime of the first six inches has sunk down into the strata below. As these substances, so necessary to the growth of plants, sink down into the earth when wet, so they rise in the form of nitrate when the ground is dry. So that underdraining gives the farmer control by clovering and root cropping, of more valuable elements and greater quantities of them, than he can afford to buy.

10. The last object of draining we will mention is, to render the farm and neighborhood more healthy. This is no unimportant consideration. We know of districts of country many miles square which twelve years ago were greatly subject to chills and fevers, but which, by only partially draining and liming, have become almost entirely free from these maladies. It is just what any thinking person would suppose. Where the land is low and the water lies either on the surface or within an inch or two of it, the surface vegetation is decomposed by the action of the moisture as soon as the warm rays of the sun fall upon it. Malarial marsh gas is eliminated; bilious and intermittent fever, stomach and bowel afflictions, that carry off numbers of children, follow as a natural and necessary consequence. Where there is only a small pond hole, that dries up in summer, near the house, doctors are sure to be in demand. We hardly know where to stop writing on this important subject. Many other reasons for draining will readily suggest themselves, and farmers should study the various methods of draining wet land.

How to Cure Hams.—This receipt is fifty years old, and it is the best. To each twenty pounds of fresh meat make a mixture of one-fourth of a pound of brown sugar and a dessertspoonful of ground saltpetre; rub this well by hand into the meat; then with coarse salt cover the bottom of a barrel, say to half an inch; put in hams, and cover with half an inch of salt, and so on until the barrel is full; hams should remain in a cool place four weeks; when salted, wipe and dry them, and get some whole black pepper, which you must grind yourself, and pepper thoroughly, especially about the hock and bone; let the ham lie for two days; then smoke for eight weeks.

Axle-Grease.—A first-rate axle-grease is made as follows: Dissolve half a pound of common soda in one gallon of water; add three pounds of tallow and six pounds of palm oil, or ten pounds of palm oil only. Heat them together to 200 or 210 degrees Fahr.; mix, and keep the mixture constantly stirred until the composition is cooled down to 60 or 70 degrees. A thinner composition is made with half a pound of soda, one gallon of water, one gallon of rape oil, and a quarter of a pound of tallow, or palm oil.

Driving Nails Into Hard Wood.—The editor of an agricultural periodical witnessed an experiment of driving nails into hard seasoned timber, fairly dried. He says that the first two nails, after passing through a pine board, entered about one inch, and then doubled down under the hammer; but on dipping the points of the other six or eight nails into lard, every one was driven home without the least difficulty. Carpenters who are engaged in repairing old buildings sometimes carry a small lump of lard or tallow for this purpose on one of their boots or shoes.

Good Well Curbing.—The best timber for curbing a well is hemlock, which is very durable when under water, and gives no flavor to the water. Of the woods some mention, all would rot very quickly except pine and tamarack, but pine is objectionable on account of its strong flavor. If hemlock cannot be procured, tamarack would be the best. The timber should be cut in two or three inch planks, and put together by halving the timbers at the end, and holding the halved parts dovetailed or cornered together, so that the sides cannot be forced in by the pressure of the earth, the upper half of one piece fitting upon the lower half of the other piece.

To Repair Leaky Roofs.—One of the very best preparations for repairing roofs that leak is to procure coal tar at the gas-works, and mix finely-sifted coal ashes or road dust with it till about as thick as mortar. Plaster with this carefully around leaky-roofed valleys or gutters, or about chimney flushings. It will soon set as hard as stone, and apparently as indestructible. This preparation is very cheap, and would probably answer equally well spread all over a roof previously laid with felt or roofing paper. Once put on properly, it would seem to be there for all time.

A Cheap Rain Gauge.—To make a rain gauge for farmers' use, just as good as if it cost three dollars, take a quart fruit can free from dents, hold the top in the fire until the solder is melted, then knock it off; place the can on a post, with brackets nailed around to keep it in place. Make a rule six inches long, divided into tenths of inches—one made out of a strip of slate is best. Measure the rain every morning after falling. An inch of rain is a good rainfall, if it comes gently. This in weight will be 226,875 pounds, or 113 tons 875 pounds to the acre.

Burning Stumps.—Tree stumps are said to be easily removed by boring a two-inch hole eighteen inches deep into the stump. Do this in the fall, and fill with a concentrated solution of saltpetre, and plug up to keep out water. By spring it will have permeated every part. Then fill the hole with kerosene, set on fire, and the whole stump, it is said, will be consumed, even to the roots. It would seem to be feasible, and it is certainly an easy way to get rid of stumps. The ashes will remain to fertilize the soil.

How to Get Rid of Rats.—The *English Standard* says: "Several correspondents write to announce the complete extirpation of rats and mice from their cow-stalls and piggeries since the adoption of this simple plan: A mixture of two parts well-bruised common squills and three parts finely-chopped bacon is made into a stiff mass, with as much meal as may be required, and then baked into small cakes, which are put down for the rats to eat."

Whitewash That Will Stick.—To make whitewash that will not wash off by the rain, one peck of lime should be slaked in five gallons of water, in which one pound of rice has been boiled until it is all dissolved. The rice

water should be used hot, and the mixture covered up closely until the lime is slaked. Then add a pound of salt, and the wash heated to boiling when used. It is not an expensive preparation. It can be prepared by any person wishing to use a good wash, and is highly satisfactory. Brother farmers, try it.

Signs of a Prosperous Farmer.—When lights are seen burning in his house before the break of day, in winter especially, it shows that the day will never break on the breaking in of the winter of adversity.

When you see him drive his work instead of his work driving him, it shows that he will never be driven from good resolutions, and that he will certainly work his way to prosperity.

When he has a house separate from the main building purposely for ashes, and an iron or tin vessel to transport them, it shows that he never built his dwelling for a funeral pyre for his family, and perhaps himself.

When his hog-pen is boarded outside and in, it shows that he is "going the whole hog or none," in keeping plenty inside his house and poverty out.

When his sled is safely housed in summer, and his farming implements covered both winter and summer, it plainly shows that he will have a good house over his head in the summer of early life and the winter of old age.

When his cattle are properly shielded and fed in winter it evinces that he is acting according to Scripture, which says that "a merciful man is merciful to his beast."

When he is seen subscribing for a newspaper and paying for it in advance, it shows that he is speaking like a book respecting the latest movements in agriculture, and that he will never get his walking papers to the land of poverty.

To Clean an Old Roof.—Those wishing to know the best means of removing moss and earth accumulations from an old shingle roof, are advised to sprinkle lime freely along the comb of the roof, and let the rains dissolve and carry it over the shingles. Every particle of dirt and moss will be removed by it. If kept clean, shingles will last much longer. This method is as good and cheaper than any direct application to the shingles.

Paint for Farmers.—Farmers will find the following profitable for house or fence paint: Skim milk, two quarts; fresh slaked lime, eight ounces; linseed oil, six ounces; white burgundy pitch, two ounces; Spanish white, three pounds. The lime is to be slaked in water, exposed to the air and then mixed with about one-fourth of the milk; the oil in which the pitch is dissolved to be added a little at a time, then the rest of the milk, and afterward the Spanish white. This is sufficient for twenty-seven yards, two coats. This is for white paint. If desirable, any other color may be produced; thus, if cream color is desired, in place of the part of Spanish white use the other alone.

To Prevent a Carriage from Spotting.—A newly-varnished carriage is liable to spot. To prevent this some wash the carriage two or three times in clean cold water applied with a sponge instead of using a hose; this will help harden the surface, and prevent it to some extent from being injured by the mud or water getting splashed on the job. Never let mud dry on the surface, and then wash off expecting to see no spots on the varnish. You will certainly be disappointed, and the only way to remedy this evil will be to have it revarnished. Soft water is better than hard water for the washing

of carriages, as the lime which is in the hard water is very liable to injure the varnish.

Removing Carbonic Acid Gas or Foul Air from Wells.—A correspondent gives an account of an extemporized apparatus for removing carbonic acid gas from wells. It was simply an opened out umbrella let down and rapidly hauled up a number of times in succession. The effect was to remove the gas in a few minutes from a well so foul as to instantly extinguish a candle previous to the use of the umbrella. Whenever there is an escape of gas in an apartment, the adoption of this plan will be found useful.

To Render Wood Uninflammable.—Professor Kedzie, of the Agricultural College of Michigan, an expert chemist, says that a paint or wash made of skim milk, thoroughly skimmed, and water brine, will render wood uninflammable, and he proved it by experiment. He said this paint, or whitewash, is durable, very cheap, impervious to water, of agreeable color, and, as it will prevent wood from taking fire, urged its use, particularly on roofs, outbuildings, barns, etc.

Remedy for Burdocks.—It is said that a certain and speedy remedy for burdocks has been found in kerosene oil. A small quantity poured into the heart of a plant, directly after cutting, leaves no trace of their existence save a small hole in the earth where they stood. Refined or crude oil will accomplish the purpose just as well.

Paint for One Cent a Pound.—To one gallon of soft, hot water, add four pounds sulphate of zinc (crude). Let it dissolve perfectly, and a sediment will settle at the bottom. Turn the clear solution into another vessel. To one gallon of paint (lead and oil), mix one gallon of the compound. Stir it into the paint slowly for ten or fifteen minutes, and the compound and paint will perfectly combine. If too thick thin it with turpentine.

A Good Word for Toads.—Toads, according to Prof. Miles, live almost entirely upon slugs, caterpillars, beetles and other insects, making their rounds at night, when the farmer is asleep—and the birds, too—and the insects are supposed to be having their own way. French farmers understand these facts so well that they purchase toads, at so much a dozen, and turn them loose.

Protect the Swallow.—Among insectivorous birds the swallow is worthy of great encouragement. An examination of the stomachs of eighteen swallows killed at different seasons of the year showed that they contained an average of 406 undigested insects each, and not a single grain of corn (of any kind), or the least particle of fruit or a trace of any vegetable.

Plan for Keeping Hams.—A very good way of keeping hams is to wrap them in strong brown paper so that the ashes cannot come in contact with them. Then pack them in clean, hard wood ashes, in dry boxes or barrels. This will keep well cured hams quite sweet, as the ashes serve as a protection against insects. The boxes should be set in a cool, dry place.

Improving Lawns.—For ridding lawns of unsightly weeds, such as plantain and dandelions, the following plan is recommended by an experienced gardener: To the end of a light wooden rod attach a small sponge, or better, wind a few thicknesses of cloth around it, dip the sponge in oil of

vitriol, and with it touch the heart of the weed. The oil of vitrol may be carried in a wide-mouthed bottle at the end of another rod.

Mold in Cellars.—To get rid of mold in cellars, put some roll brimstone into a pan and set fire to it; close the doors, making the cellar as nearly air-tight as possible, when the fungi will be destroyed and the mold dried up. Repeat this simple and inexpensive operation every two or three months for two or three hours at a time.

Thawing Frozen Apples.—It is stated by those who have had the advantage of experience, that if apples which have been frozen are thawed in the dark they are uninjured; but if in the light, they very soon become unfit for use. We should suppose the same result would most likely appear if the experiment were tried with potatoes.

Washing Harness.—It is bad policy to wash harness with soap, as the potash injures the leather. If the harness becomes rusty rub off the dirt as well as possible with a soft brush, and apply a dressing of grain black, followed with oil or tallow, which will fasten the color and make the leather soft and pliable.

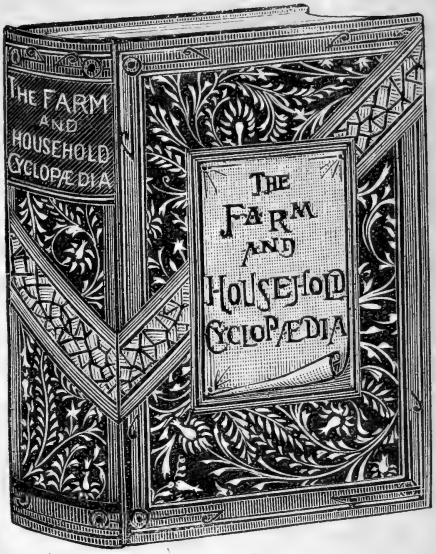
A Good Suggestion About Harness.—Add a little glycerine to the grease applied to harness, and it will be kept in a soft and pliable state, in spite of the ammoniacal exhalations of the stable, which tend to make it brittle.

Gas Tar for Wagon Wheels.—A farmer who has tried it speaks in the highest praise of gas tar for painting wagon wheels, stating that it tightens tires and spokes better than anything that can be tried.

Mice in the Grain Chest.—If you are troubled about the grain chest with mice, watch for their holes and scatter a little copperas in them. A few grains will drive them away.

Rats and Mice.—Rats and mice will go into a trap much more readily if a piece of looking-glass is put in any part of the trap where they can see themselves. They are social little creatures, and where they can see any of their tribe, there they will go.

The Farm and Household Cyclopædia



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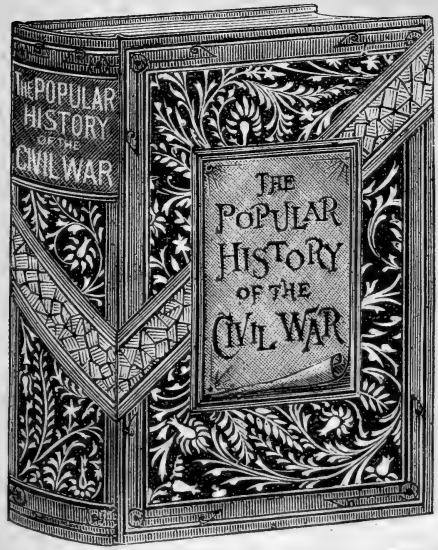

We suppose that almost any intelligent American of the present day, if he were limited to the possession of *three books*, would select as follows: 1. The Bible; 2. A Dictionary: 3. A History of the Civil War. The great Civil War between the North and South, in the years 1861 to 1865 inclusive, was, next to the American Revolution, the most stupendous event in the history of our great country. During those memorable four years, when our fair land was bathed in the blood of its gallant sons, the whole world looked on with breathless interest. It is but natural that an event of such paramount importance in our national history should have engaged the attention of every prominent American historian. Almost a multitude of books directly bearing upon the Rebellion have been published. Yet it is our firm belief that the War Histories heretofore published are but meagerly adapted to the wants of the masses of American citizens to-day; first, because they are too expensive, involving an outlay greater than the majority of people can afford to make; and, second, because they are too lengthy, going so minutely into particulars and details that they become dry and uninteresting. This work is most aptly and appropriately entitled "THE POPULAR HISTORY OF THE CIVIL WAR," because it meets the *popular* demand for an authentic history of the Rebellion, written in the most entertaining manner and published at a price within the reach of all. The book is a thorough, complete and authentic history, not only of every important battle and naval engagement that occurred during the war, but is likewise very complete in its treatment of the political conditions, sectional differences and other causes which brought on the great conflict. It is just such a war history as every American citizen should possess, and will prove of the utmost interest and value, not only to those who well remember, and some of whom participated in the war for the Union, but especially to that large class who have grown to manhood and womanhood long since the war closed, none of whom, not having read and carefully studied the history of the greatest contest of the Nineteenth Century, can claim to be well-informed and intelligent American citizens.

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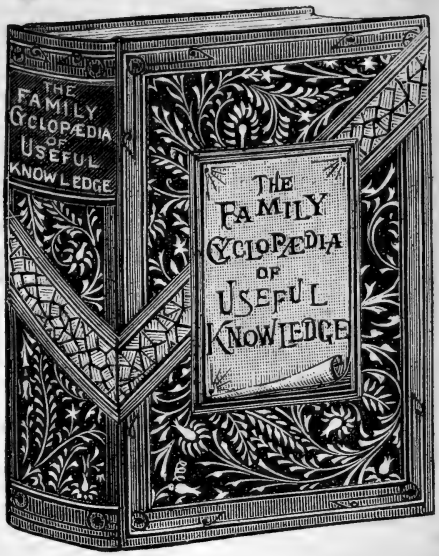

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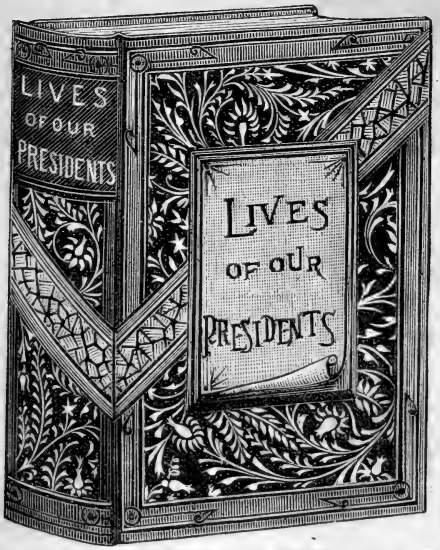

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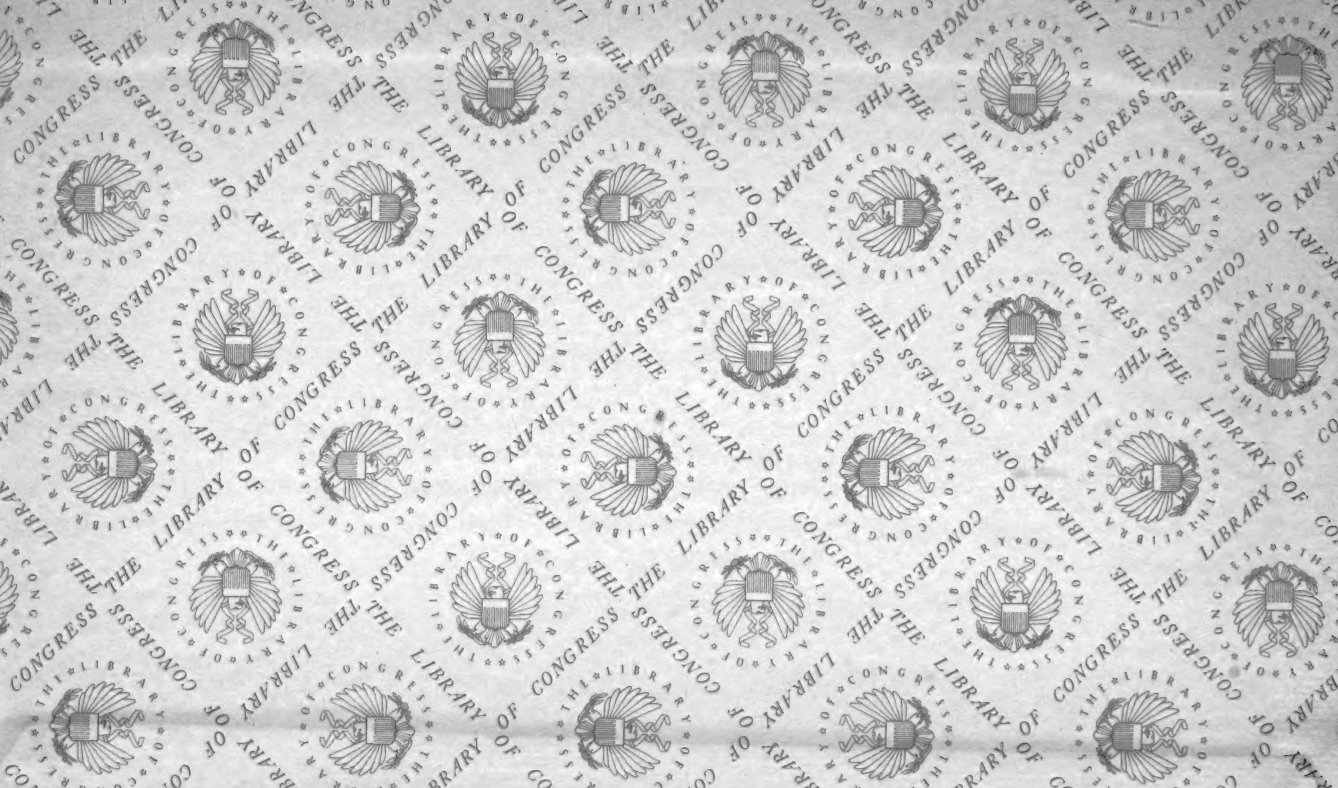
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